Surgery

PATIENT SAFETY, OT ZONE AND SURGICAL POSITIONS

WHO Surgical safety checklist

00:01:44

- · Has 3 components :
- Sign in :- Ward → OT complex
 - i) Confirm identity
 - ii) Written consent
 - iii) Site marking -> Preferably by surgeon
 - iv) Allergies
 - v) Prophylactic antibiotics
 - vi) Serology
- Time out :- Before surgery :- Reconfirm identity
 - Surgeon Name of surgery proposed

 Duration of surgery

 Anticipated blood loss
 - Anesthetist > Any specific concerns
 > Prophylactic antibiotics
- · Sign out :- Skin closure
 - Nurse > Count the equipments > Count gauze pieces
 - Surgeon > Name of actual surgery performed > Critical steps > Equipment malfunction
 - Anesthetist > Actual blood loss concerns, if any
- mc cause of wrong site surgery -> Communication errors
- Lined gauze pieces [with radio opaque line] used to locate if gauze piece left inside body → using C-arm or X-ray.

Consent

00:10:47

- · Consent must include:
 - i) Identity of patient
 - ii) Name of surgery
 - iii) Details of surgery

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- iv) Potential complications :- Those with incidence rate of > 1 %
- v) Alternate procedures
- vi) Name of surgeon
- vii) Consent signed by: > Patient Witness → Surgeon

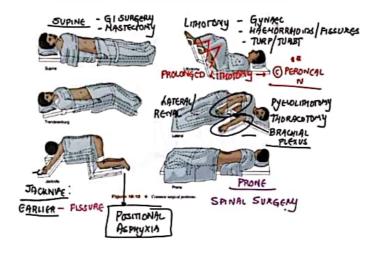
OT zoning

00:14:16

- Protective zone Change rooms
 - Transfer bay
 - Pre and post-op rooms
 - ICU / PACU
- Clean zone [connects protective zone to aseptic zone]
 - Equipment store room
 - maintenance workshop
- Aseptic zone OT
- Disposal zone Where all waste is_disposed

Common surgical positions

00:16:33



- Supine :
 - mc position used for surgeries [abdominal, breast surgery etc]
- Lithotomy:
 - For obstetric, gynaecological, urological procedures
 - Hemorrhoid and fissure surgeries
 - TURP, TURBT
 - Disadvantage :- If lithotomy prolonged; legs not supported properly -> improper padding or over abduction -> Injury to common peroneal nerve

- · Lateral / Kidney position :
 - For thoracotomy, pyelolithotomy, nephrectomy
 - Disadvantage: Over abduction of arm → Brachial plexus injury
- Jack-knife position:
 - Hemorrhoid and fissure surgeries
 - Not used now due to risk of positional asphyxia.
- Prone position: For spinal surgeries
- · Sitting / Fowler's position :
 - For cranial surgeries → posterior fossa procedures
 - Advantage : Better exposure
 - Provides relatively blood less field to operate
 - Disadvantages: ↑ Risk of air embolism → Prevented by tying /
 ligating the vein before cutting it





- · Rose / Barking dog position :
 - For thyroidectomy
 - Patient is supine
 - Towel roll placed below shoulder blades → Causes neck extension
 - Head supported using head ring
 - 30° head end elevation → relatively blood less field
 - ↑ risk of air embolism → ligate veins before cutting to prevent it

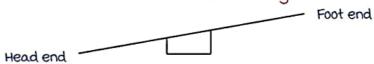
· Air embolism :

- manifests as sudden drop in saturation . At least 10 cc of air can give rise to air embolism
- When suspected, patient put into Durant's / recovery position;
 Foot end up head end low and right side up -> makes sure air doesn't enter pulmonary circulation
- Aspirating blood out of central line might suck out air emboli

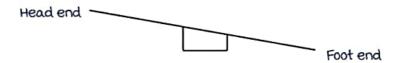
Neutral position: - Head end and foot end at same level



 Trendelenburg position: - Raised foot end. Used in pelvic surgeries and varicose vein surgeries



Reverse Trendelenburg position: - Head end raised



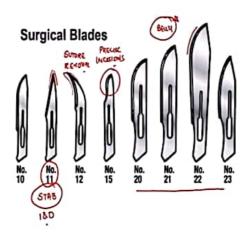
C Reverse Trendelenburg + right side up position] → used for "Laparoscopic cholecystectomy"

- Advantage: Bowel moves down and left, opens up gall bladder
 fossa for easier dissection
- Disadvantage: Co_a accumulates beneath right diaphragmatic causing right shoulder tip pain [mc complication laparoscopic cholecystectomy]

SURGICAL BLADES AND ENERGY SOURCES

Surgical blades

00:00:26



- · No. 12 :- Suture removal
- Blades with belly are used to make incisions
- No. 15:- To make precise incisions
- No. aa :- Incisions for thoracotomy, laparotomy.

Belly of the blade is the sharpest portion of a blade.

- Passing sharp objects
 Ideal: Kidney tray
 in OT
 With pointed end towards you . i.e; surgeon
- making incision
 Blade perpendicular to skin
 Oblique technique
 will cause undermining
 of edges

• Energy sources ightarrow Leading cause of fire in OT .

Energy Sources

CATTERY





· Cautery:-

HONOPOLAR

Bipolar cautery	monopolar/unipolar cautery
 Circuit: Completed locally between a prongs. Current does not flow through body. 	Circuit:- machine Current Sovie tip Current Cautery Cut/coagulate pad [current through body]
Only coagulation can be done	 Blue button :- coagulate → High - voltage alternating current Yellow button :- cut → Low - voltage continuous current .

- Cautery pad:-
 - Not attached → No circuit, no current.
 - must be properly placed covering adequate surface area (wide contact area), in a well vascularized area with less hair → If placed improperly; burns at cautery pad site.
- monopolar :-
 - Current passes through body → Avoided in patient with cardiac pacemaker [6ipolar used]
 - Thermal damage to nearby vital nerves → ∴ Avoided in Parotid, thyroid, penile surgeries [Bipolar used]
- · Ligasure :- Is an energy source
 - uses heat + pressure → coaquilation
 - Can coagulate vessels upto 7 mm in diameter.
 - 1st generation ligasure → only coagulation
 - and generation ligasure → coagulation followed by cutting.

02 Surgical Leave Feedback blades and energy

sources

- Oscillatory blade at 20000 50000 Hz oscillation \rightarrow causes protein denaturation \rightarrow coagulation without heat production.
- Can be used close to vital structures
- Precise cut
- Can coagulate vessels upto 7 mm in diameter
- can cut through scar tissue.

Harmonic Scalpel



- Thunderbeat S:-
 - Has features of both ligasure and harmonic scalpel .



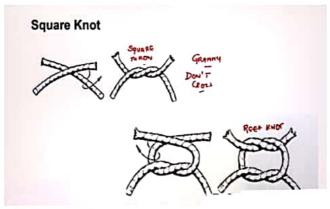
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SUTURES AND KNOTS

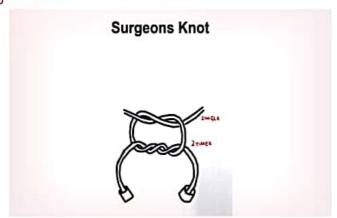
Types of knots

00:00:39

Square / Reef knot :- Secure knot .



- Granny's / Slip knot: No crossing; Insecure knot
- Surgeon's knot :- Secure Knot



Skin suturing

00:05:08

- Skin → Everted edges
- Bowel → Inverted edges
- · 3 instruments :- Needle holder; Toothed forceps; Straight scissors
- · Simple suture :- Aim : Everted edges
- · If everted edges not possible;
- mattress sutures :-



 If 'x' is depth of wound > Then, distance between wound edge and Knot on each side must be 'x' > Distance between a sutures must be 'ax'

Skin Suturing Techniques

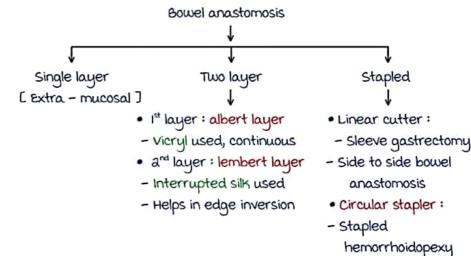


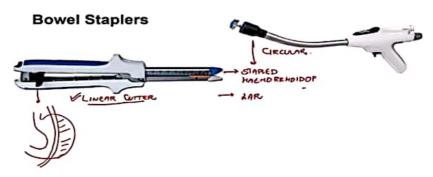
- · Sub-cuticular sutures:
 - Continuous bite from inside
 - No mark on skin
 - Cosmetically better
 - 3-0 monocryl [cutting / reverse cutting needle]
- · Aberdeen's / Cobbler's Knot :-
- ... Carrect way for continuous suture
- Running locked sutures: Even distribution of tension
- Far near near far suture :- For obliterating large cavities

Bowel anastomoses

00:16:49

· Inverted edges required; Strongest layer: Submucosa





- LAR

-Esophagojejunostomy

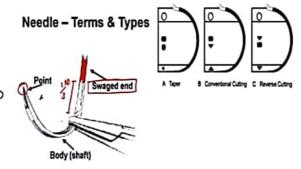
- Leading cause of leak → ↑ tension
- Disparity in luminal sizes → Cheatle's split → Longitudinal split,
 anti mesenteric border, in narrow lumen
- Connell loop :- Edge of anastomosis; Ensures inversion of mucosa.

Writte abare

Needles and types

Round body:

- O cross section
- Atraumatic
- used for bowel,
 bladder, ureter, CBD



- Cutting :- Δ cross section \rangle Traumatic
- Reverse cutting: V cross section } used for skin, fascia.
- Half circle → GIT
- 'J'-shaped → vagina
- Compound circle → Oral cavity
- Quarter circle → eye

Sutures

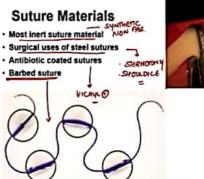
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- Smaller number → Thicker; easier to handle thread
- Larger number → Finer: more likely to break
 - → monofilament :- Single filament
 - Disadvantage : Has 'stronger memory'
 - C Tendency to resist knot formation → opens up as a result]
 - Eq :- Polydioxanone(PDS); Monocryl; Nylon (Ethion); Cataput
 - > Braided :- multiple intertwined filaments

XXXX

- Easier to handle / Knot
- Disadvantage : Higher wound infection rate
- eg: Silk; Vicryl
- > Nature :- more tissue reaction
- Synthetic :- more inert
 - most inert → Synthetic non-absorbable
- Absorbable sutures :-
 - → Natural:
 - Catgut [From sub mucosa of sheep gut] :-
 - Absorption time (by enzymatic degradation): 10-20 days
 - Tensile strength: 3-5 days
 - Chromic catgut :- Catgut coated with chromic salts
 - Absorption time: 20-30 days
 - Tensile strength: 7-9 days
 - → Uses: Suture sub cutaneous tissue. Now replaced by Vicryl.

- → Synthetic:
 - monocryl :- Best for sub cuticular
 - monofilament; 3-0
 - Vicryl :- Braided polyglactin; Dissolves completely (Proteolysis)
 in 60-90 days
 - → Uses :- Bowel anastomoses 3-0
 - CBD 5-0
 - ureter 5-0
 - Sub cutaneous tissue 3-0
 - → Special types of vicryl :-
 - Vicryl rapide (Polyglactin 910) :- Rapidly dissolving vicryl
 - Vicryl plus (Triclosan): Antibiotic coated; ↓ wound infections
 - Barbed vicryl:
 - Face lift surgery
 - Disadvantage : Paintui





- → PDS (polydioxanone): monofilament
 - 180 days
 - Uses :- Same as vicryl
 - Tracheo -bronchial repairs

Non - absorbable sutures

00:48:30

- → Natural: → Silk: Braided
 - Skin, and layer of bowel anastomoses
 - → Cotton :- Not used much
- → Synthetic:
 - → Prolene (Polypropylene):-
 - uses :- used as mesh material, in hernia repair
 - Rectus sheath closure(No. 1)
 - Vascular repair :- Non elastic; no inflammation
 - Aorta: a-o prolene
 - → Nylon: monofilament; Ethilon
 - Uses :- Skin; Fix drains; Nerve repair; Tendon repair;
 - Cataract (10-0)

- → Polyester:- Ethibond
 - Uses :- Tendon repair; Rectus sheath
- → Surgical steel: Skin staplers; Sternotomy incisions

Suture removal timing

00:57:36

Scalp : 5 days
Face : 3-5 days
Neck : 5-7 days
Thorax : 10-12 days
Abdomen : 12-14 days

· Joint : minimum 14 days

CAUSES OF POST-OP FEVER

Post-op day - 1

00:00:32

mcc of fever on POD; -- Atelectasis

Prevention :- Chest physiotherapy
- Incentive spirometry

· POD :- Post-op day



EXCENTIVE SPRENCER

Post-op day - 2 - 3

00:01:33

- mcc of hospital acquired infection overall :- uTI
- Atelectasis causes pneumonia on 3rd day if not treated
- Superficial thrombophlebitis Emcc: IV cannula

Post-op day: 4 - 5

00:03:18

- mcc of hospital acquired infection in surgical patients:
 Surgical site infection
 - Wound infection occurring within 30 days of surgery or within I year in case of implant
- Deep Vein thrombosis prevention -> Pharmacological [LMWH]
 mechanical -> Early ambulation
 Pneumatic anti DVT stockings

Post-op day - 6

00:07:38

- Burst Abdomen / Abdominal wound dehiscence :
 - Closed rectus sheath opens \rightarrow serous discharge \rightarrow Salmon fluid

sign

management: → Emergency: - Urobag/Bogota bag laparostomy
 → Nylon/Prolene;

Cutting/Reverse cutting needle used

Definitive :- resuture rectus sheath → No.1
 Prolene used

C Length of prolene used = 4 times wound length
→ Jenkins theory of mass closure]

16 General 04 Surgery

· Predisposing factors for burst abdomen;

- Patient related factor :-
 - malnutrition
 - · Chronic cough
 - Constipation
 - Immunocompromised
 - Obesity

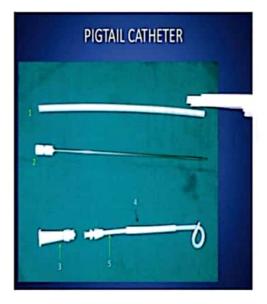
- Surgery/surgeon related factors
 - · Emergency surgery > elective
 - midline incision > transverse
 - Absorbable suture material > non - absorbable

Post-op day - 7 and beyond

00:15:28

- Intraabdominal collections or abscesses :-
- mc site: → Supine patient → morison's / Hepatorenal pouch
 → Ambulatory patient → Pouch of Douglas / pelvis
 → Overall → Pouch of Douglas / pelvis
- · Features :- fever with chills and rigors
- · 10C:- CECT abdomen
- management :-CT/usq-guided pigtail catheter drainage

Also used to drain liver abscesses



WOUNDS

Wound scoring systems

00:00:15

ASEPSIS wound score :-

- A -> Additional treatment
- s → Serous discharge
- $\varepsilon \rightarrow \varepsilon$ rythema
- P → Purulent exudate
- S → Separation of deep tissues
- 1 → Isolation of bacteria
- S → Stay in hospital

Southampton's wound score :-

- O → Normal healing
- 1 → mild bruising / erythema
- a -> Erythema + other signs of inflammation
- 3 → Clear or serosanguinous discharge
- 4 → Pus discharge
- 5 → Separation of tissue / wound breakdown

Types of wounce

00:03:25

- 1 → Clean wound [Surgical Site Infection rate (SSI): < a%]:-</p>
 - clean incised wounds
 - Eg :- Thyroid surgery
 - Breast surgery
 - uncomplicated hernia surgery
 - Coronary artery bypass graft
 - Knee replacement
- II → Clean contaminated wound [2 10%]:- GI/GU system when no inflammation
 - Eq :- Elective / interval cholecystectomy
 - Elective appendicectomy
 - Bowel surgery in prepared bowel
 - Removal of urinary stone when no UTI
 - Early phase of duodenal perforation [Chemical peritonitis stage]

III -> Contaminated wound [10 - 20%] :- GI / GU system entry when non-purulent inflammation +

Eq: - Emergency cholecystectomy

- Emergency appendicectomy
- Bowel surgery in unprepared bowel
- Removal of urinary stone in UTI

IV → Dirty wound [> a0%]:- pus present

Eq:- All abscesses

- Fecal contamination
- Bacterial peritonitis
- Neglected traumatic wound > 6hrs

→ Golden perioa +or traumatic wouna = 6 hrs → Decisive period = 4 hrs → Golden period for trauma = 1 hrs

Clean case is the 1st case posted on an elective OT list.

Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with marrow Edition 4 videos.

Prevention of wound infection

00:13:22

- Hand washing :- Simplest and most effective way to prevent wound infection
 - Alcohol hand rub v/s soap and water → Equivalent if hands not visibly soiled
 - · Surgeon:- Hands washed with hands up, elbows down
 - Duration: 1st hand wash → 3 5 min: Subsequent surgeries → 2 min each
 - Frequently missed parts in hand wash :-

Thumb

Most Commonly
Missed Areas

O Least frequently missed

O Least frequently missed

O Least frequently missed

Most frequently missed

Most frequently missed



3) Use of prophylactic antibiotics:-→ Best time: I hr before surgery

L, Prolonged surgery: Repeat dose after 4 hrs

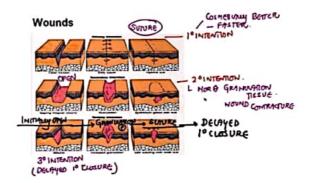
- Clean and contaminated wound → Single dose is enough [exception :- Implant usage]
- 4) Hair removal :- Best method and time → On table clipping of hair
- 5) Cleaning of part: Alcohol based solution / Betadine solution used.
 - Abdominal surgeries → males: Nipples → mid-thigh area
 - → Females:- Inframammary fold → mid - thigh area
 - While cleaning abdomen :- Swab moved medial to lateral
 - While cleaning thigh: Swab moved lateral to medial
 - Sebaceous cyst of forearm :- Clean incision site and go circumferentially outwards



- Limb surgery:- Clean till one joint up
- Allow cleaning liquid to dry before commencing surgery.
- 6) Adequate hemostasis and proper dissection
- 7) Drapes: Cloth v/s plastics (both offer same protection)
- 8) Avoid hypothermia and hyperglycemia.
- 9) Ideal OT parameters :- Temperature : 18 22°c
 - Relative humidity: 50 60%
 - Minimum 15 air exchanges / hr [At least 4 fresh air changes]
 - Air inside OT should flow from sterile to less sterile area
 - Ultra clean laminar air flow system inside OT
- 10) Washing cavity with antiseptic solution → not useful; saline is
- II) O_a inhalation immediate post op \Rightarrow Reduces wound infection rate

Types of wound healing

00:28:41



- · Healing by Primary intention:
- Wound sutured
 - Faster healing, cosmetically better scar
- Secondary intention:
 - wound left open → heals by contracture
 - more granulation tissue; Bad scar
 - more wound contracture → Keloid / Hypertrophic scar formation

Dressing techniques and materials

00:31:35

- VAC dressing / Negative pressure dressing :- 125 mm Hg
 - occlusive dressing connected to VAC unit

Sucks out exudate and brings in more cell which hasten wound healing.

- Uses :- Chronic non-healing wounds like :
 - Venous ulcers
 - Arterial ulcers / Neuropathic ulcers
 - Bed sores
 - Burns wound without eschar
 - Diabetic ulcer without osteomyelitis

- Alginate and foam dressing :- Absorbs exudate
 - High drainage wounds like abscess
- Hydrocolloid and hydrogel dressings :- Occlusive, waterproof
 - Drawback: → Causes maceration of skin edge.

Does not absorb exudate.

Transparent film dressings: → Opsite

→Tegaderm

- Occlusive, waterproof
- Advantage : → Transparent

→ Bathing possible

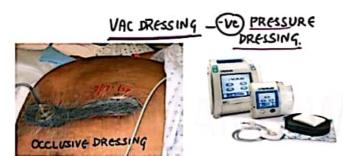
→ maceration of skin edge - Drawback:

→ Does not absorb exudate

Dressing Materials



Dressing Materials



SURGICAL NUTRITION

- Surgical nutrition → Enteral Parenteral
- Advantage of enteral over parenteral :- Physiological, cheap
 - Entero-hepatic circulation (+)
 - Intestinal microvilli patent
 - Prevents translocation of gut bacteria.

Enteral nutrition

00:02:25

- Best route :- Oral
- If oral not possible → Nutritional requirement; >> 3 weeks
- < 3 weeks :-
- Good gastric emptying :- "Ryle's tube / Nasoqastric tube"
 - → Length :- From earlobule to tip of nose to xiphisternum → Best position: - Sitting with neck flexed
- Poor gastric emptying:
- "Nasojejunal tube / Freka's tube "
- -> 3 weeks :-
- Good gastric emptying:
 - "Feeding gastrostomy"
 - Done at body of stomach, along greater curvature.
 - Purse string suture used to hold it in position
 - → Stamm gastrostomy: Stab incision made; more peri-drain leakage.
 - → Witzel method: Tunnel created for tube placement before piercing stomach wall; Less peri-drain leakage
 - → PEG [Percutaneous Endoscopic Gastrostomy]: Tube placed taking endoscopic light as reference. Usually clubbed with tracheostomy. Types of methods-push, pull and introducer
- Advantage :- More physiological than jejunostomy. Disadvantage :- 1 aspiration risk.

```
    Poor gastric emptying :- "Feeding jejunostomy"
    Along anti-mesenteric border
    Stamm
    Witzel
```

```
    Complications of enteral nutrition:
    Tube related [ mc ] :- Block or migration of tube
    Tube may get pulled out
    Feeding regime related: - mc: Osmotic diarrhoea
```

Parenteral nutrition

00:15:30

- Indications :- Short bowel syndrome.
 - Prolonged paralytic ileus (> 72 hours).
 - Acute IBD episodes .
 - Initial phase of acute severe pancreatitis.
 - High-output fecal fistula [> 200cc / 24 hrs].
- · modes of TPN :-
 - 1) Central line :- Best
 - For nutrition, most preferred → Subclavian
 Subclavian :- ↑ Pneumothorax risk
 Tunneled: Least infection risk.

IJV :- Easier to insert

- a) PICC line :- Peripherally inserted central catheter
- 3) Peripheral IV line :- Least preferred
 Wide bore Short length cannula used

TPN - Total Parenteral Nutrition

00:21:57

- · 1-a L / a4 hrs
- Contains :- 40 50% carbohydrates
 - 30 40% fats
 - 10 20% proteins
 - Trace elements
 - Vitamins
- Based on carbohydrate content:

```
High osmolar TPN:- \uparrow carbohydrate \rightarrow \uparrow Co<sub>a</sub>, RQ > 1
Low osmolar TPN:- \downarrow carbohydrate \rightarrow \downarrow Co<sub>a</sub>, RQ < 1
```

- Preferred in patients with pulmonary failure.

- · Complications of TPN :-
 - · Central line related :- Pneumothorax
 - Air embolism
 - Blockade
 - migration
 - mc :-

CIS /CRS [Catheter induced sepsis → same organism in catheter tip and blood / Catheter related sepsis → different organisms]

- Feeding regime related :-
 - mc " overall " :- Hyperglycemia
 - Cholestasis :- Common reason to stop TPN \rightarrow predisposes patient to acalculous choleystitis .
 - Refeeding syndrome :-

Chronically malnourished of TPN Refeeding syndrome Lanabolic state]

- Causes: Hypomagnesemia
 Hypophosphatemia
 → Arrhythmias and CHF
 Hypokalemia
- Prevention: Gradual 1 in volume of TPN infusion.
 - Thiamine supplementation
 - Strict electrolyte monitoring after TPN has been started.

Short bowel syndrom

00:32:32

- No meaningful absorption
- · <a00 cm of small bowel
- Causes: mc: Vascular causes → Superior mesenteric artery embolism
 - Crohn's disease
 - Post trauma
- Features :- malabsorption features
 - Bacterial overgrowth

- Treatment :-
 - > Long term TPN
 - → Small intestinal transplant
 - Surgeries:
 - Bianchi procedure :- longitudinal splitting of bowel § end to end anastomosis → ↑ absorption
 - Disadvantage:- Narrow lumen, compromised vascularity.
 - STEP [Serial Transverse Enteroplasty]:- Linear cutter fired alternatively on bowel. Bowel assumes a Zig zag shape with ↑ surface area → ↑ food absorption.

SHOCK

Hypovolemic shock

00:00:32

Class	I,	II	111	IV
• % Blood volume lost	0 - 15%	15% - 30%	30 - 40%	> 40%
 Blood loss amount 	400 − 500c.c ↑	IL	1.5 L	>aL
 Pulse rate 		1	↑ ↑	Not
• S&P		Normal	↓	recordable N/R
• D&P	Normal	Narrow	Narrow	N/R N/R
RRUrinary output		ĵ ↓	↓ ↓	↑↑↑ Anuria
(uo) • mental status		Anxious,	Confused	Comatosed
	Oral liquida	Thirsty	In diamental	m - 45 i /n
 management 	Oral liquids	loids	IV crys- talloids +	massive blood
		[RL>NS]	colloids [3:1 ratio]	Transfusion
Base deficit	o to -a	-a to -6	-6 to -10	-10 or less

- Hypovolemic shock: mc type of shock
- Pathophysiology of shock :-
- · Class I shock :-
- Effects similar to blood transfusion.
- .. All parameters are in normal range.

1 DBP

Pulse rate is earliest manifestation of hypovolemic shock.

- Class III shock: Decompensated hypovolemic shock
 S&P first starts to reduce here.
 ↑ Blood loss → ↓ S&P, ↓ CO
- Best clinical indicator of fluid resuscitation: Urinary output
 Adults: > 0.5 ml/kg/hr
 Children: > 1 ml/kg/hr
- Best indicator to determine amount of fluid required in a patient with shock: PCWP [Pulmonary capillary wedge pressure] > CVP [Central venous pressure]

Massive blood transfusion

00:14:04

- Replacing entire circulating volume in a4 hrs [OR]
 Transfusing > 10 units /a4 hrs.
- · Complications:
 - Hypothermia; Hypocalcemia; Hypokalemia/Hyperkalemia;
- TRALI [Transfusion Related Acute Lung Injury]
- Infection
- mcc of death: Coagulopathy → Hypothermia; Dilution of clotting factors in stored blood; ↓ platelets may be caused →
 L PRBC: FFP: Platelets::1:1:1] → ↓ coagulopathy risk.

Indices to monitor shock

00:21:02

- Shock index = $\frac{HR}{SBP} \rightarrow$ > 0.9 suggests decompensated shock/Higher mortality rate .
- modified shock index = $\frac{HR}{MAP}$ \rightarrow most sensitive index
- ROPE [Pulse rate over pressure evaluation] =
 PR → > 3 → decompensated shock.

End points of resuscitation

00:24:15

- Systemic circulation: mvos [mixed venous oxygen saturation]
- muscle perfusion : NIRS [Near infra-red spectroscopy]
- Brain perfusion : NIRS

Triggers for peri-operative RBC transfusion: Hb [g/dl]: <6 → Benefit

6 - 8 → Only give if ongoing bleeding present

>8 -> No benefit

Blood substitutes

00:28:38

- 1st generation :- Perfluorocarbon
- and generation :- Stroma free Hb
- Next generation :-
 - → Polyethylene glycol hemoglobin (PEG)
 - → Hemospan a/k/a mP40x
 - → Pyridoxylated hemoglobin polyoxyethylene conjugate (PHP)

Hypovolemic shock v/s other types of shock

00:29:46

	Hypo- volemic Class - 111	Cardio- genic	Neuro- genic	Anaphy- lactic	Septic - warm	Septic - cold
Pulse rate	1 1	1 /↓	↓	1 1	1	1 /↓
S&P	↓ ↓	↓	↓	↓	1	↓
Cardiac output	↓ ↓	↓	↓	1	1	↓
Peripheral Vascular resistance	1	1	↓	1	↓	1
JVP	↓	1	↓.	1	Normal	1

SIRS and sepsis

00:40:38

- Systemic inflammatory response syndrome :- Body's response to Inflammation.
- · IL-1, IL-6, TNF∝
- → Temperature <36°c or >38°c
- → WBC < 4000 or > 12000 [OR] > 10% bands forms peripheral smear
- → RR > 20 / min or pCo < 32 mm Hg
- → PR > 90 / min without influence of inotropes
 - Any a parameters (+) → SIRS
- · Sepsis :- SIRS + Known foci of infection
- Septic shock :- Sepsis causing hypotension
 But it does NOT respond to fluids
- mods :- multiple organ dysfunction syndrome.
 - Failure of a or more organ systems.

Sepsis 3.0 guidelines

00:47:01

- D SIRS is out, 9SOFA / SOFA are in;
 - qSOFA: quick Sequential [Sepsis-related] Organ Failure Assessment score.
 - → SBP < 100 mm Hg [Hypotension]
 - → Altered mental status
 - → RR > aa/min [Tachypnea]
 - Any a present → Poor outcome

- SOFA score :

Score

	Score				
	0	1	а	3	4
Respiratory System PaO _a /FiO _a (mmHg)	≥400	4400	<300	<a00 with<br="">Respiratory Support</a00>	<100 with Respiratory Support
Hepatic system Bilirubin(mg/dl)	યા.a	1.2-1.9	2.0-5.9	6.0-11.9	>1a.0
Cardiovascular System	map≥ 70 mmHg	MAP <70 MMHg	Dopa- mine <5 Or Dobut- amine (any dose) ^a	Dopamine 5.1-15 or epinephrine ≤0.1 or Norepi- nephrine ≤0.1°	Dopamine >15 or epinephrine >0.1 or Norepine- phrine >0.1a
Coagulation Platelets × 10³/μL	≥150	<150	<100	450	<20
Central nervous System Glasgow coma scale	IS	13-14	10-1a	6-9	46
Renal System Creatinine (mg/dL) Urine output (mL/d)	< 1.a	1.2-1.9	2.0-3.4	3.5-4.9 <500	>5.0 <a00< td=""></a00<>

- a) Severe sepsis is out
- 3) Sepsis: Life threatening organ dysfunction caused by dysregulated host response to infection.
- 4) Septic shock: Need for vasopressors and S.lactate >2 mmol/1

Surviving sepsis guidelines

00:50:08

- · Parameters to be met in first 6hrs of resuscitation.
 - i) CVP 8-12 mm Hg
 - ii) MAP ≥ 65 mm Hg
 - iii) Urinary output ≥ 0.5 ml/kg/hr
 - iv) mvos 65%

Superior venacava O, saturation [ScvO,] 70%

Ebb and flow

00:53:41

Phase	Duration	Role	Physiological	Hormones
Ebb	<a4 hrs<="" td=""><td>maintenance of blood Volume catecholamines</td><td> ↓ BMR, ↓ temp, ↓ Oa Consumption, vasoconstriction, ↑ CO, ↑ heart rate, acute phase proteins </td><td>Catechol, Cortisol, aldoster- one</td></a4>	maintenance of blood Volume catecholamines	 ↓ BMR, ↓ temp, ↓ Oa Consumption, vasoconstriction, ↑ CO, ↑ heart rate, acute phase proteins 	Catechol, Cortisol, aldoster- one
Flow				
Catabolic	3 - 10 days	maintenance of Energy	† BMR, † Temp, † Oa Consumption, -ve Na Balance	1 Insulin, Glucagon, Cortisol, Catechol but insulin resistance
Anabolic (moore)	10 - 60 days	Replacement of lost tissue	+ve Nitrogen balance	Growth hormone, IGF

COMMON SURGICAL SWELLINGS

Lipoma 00:00:32

Benign fat collection, usually encapsulated.

- Long standing, slow growing, usually painless.
- O/E:-Soft; Pseudofluctuation (+) - Slip sign (+)
- Diagnosis :- FNAC
- management :- Excision :- Cosmetic
 - pain
 - rapid 1 in size
 - Suspected sarcomatous change → more risk in retroperitoneum, thigh.

Lipoma

- · Dercum's disease:
 - multiple lipomatosis; Treatment: same as lipoma
 - D/D:- Neurofibromatosis → FNAC to differentiate

Sebaceous cyst

00:05:37

- Is a result of blocked hair follicle which transforms to a cyst
- O/E:- Punctum[characteristic]
- H/O whitish, thready discharge from swelling
- management :- Excision
- Complications:
 - Infection → Antibiotics
 - → Pus (drainage and cyst excision)
 - Sebaceous horn → secretions exit and solidify to form a horn like structure

Dermoid cyst

00:08:52

- Epithelial elements entrapped along lines of embryonic closure.
- Epithelial lining (+)
- Tuft of hair (+) over the cyst
- 0/E:- Fluctuant swelling
- Common sites: → Outer canthus of eye
 - → Post auricular dermoid



Sebaceous Cyst



80

 D/D: Implantation dermoid → Happens due to trauma; At site of trauma.

Eq :- Post - ear piercing

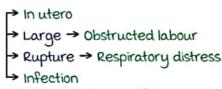


- Diagnosis: FNAC
 If cyst attached to periosteum → Bone erosion
 - : Imaging to rule out bone erosion and intra-cranial extension to be done.
- management :- excision
- · Complications :- Infection, rupture, rarely malignant change .

Cystic hygroma

00:14:01

- A/k/a Lymphangioma
- · Sequestered lymphatic tissue.
- mc location :- Posterior triangle of neck
 Other locations :- Axilla, inquinal region
- Presentation :







- O/E:- Cystic; Fluctuation (+)
 - Contains clear fluid → "Brilliantly transilluminant".
- management:
 Aspiration followed by sclerotherapy
 Best
 Excision:
 Nerve likely to get injured
 Spinal accessory nerve.

Thyroglossal cyst

00:18:23

- Remnant of thyroglossal tract.
- mc location :- midline of neck, subhyoid.
- Features: Fluctuant; moves with deglutition and with protrusion
- Diagnosis: FNAC
 To rule out if it is the only functioning thyroid tissue.
- · management:
 - Sistrunk procedure :- [Removal of cyst + tract till base of tongue + part of hyoid]

I and D → Contraindicated → Causes thyroglossal fistula



Thyroglossal Cyst

Active space

Thyroglossal fistula :- Never congenital, always acquired.
 Treatment :- Sistrunk procedure.

Branchial cyst

00:23:37

Persisting cervical sinus → Branchial cyst

- · Lined by epithelium with fluid inside
- · Features :- Swelling in neck
- · 0/E:

> Related to sternocleidomastoid muscle

[Along anterior border, upper 1/3rd of Sternocleidomastoid]

→ Fluctuant

Branchial Cyst

Branchial Cyst

- · Diagnosis :- FNAC
- management :- Excision and exploration of entire tract



- · Branchial fistula:
 - Failure of fusion of and arch with 6th arch
 - -C Along anterior border, lower 1/3rd of Sternocleidomastoid]
 - management :- Excision

Submandibular swelling

00:26:49

- Location: Submandibular triangle of neck
- D/D: Submandibular lymph node.

" $\operatorname{Bimanual\ palpation\ }$ " to differentiate from submandibular gland swelling .

Gland is palpable; Lymph node is not.

Ranula 00:28:44

- mucous extravasation cyst from sublingual salivary gland
- · Fontures :
 - Cystic swelling in the floor of mouth
 - Fluctuant
 - "Brilliantly transilluminant"
- management :- marsupialization or excision of cyst + sublingual gland
- mc structure injured during ranula surgery: Sub-mandibular gland duct
- mc nerve injured: Lingual nerve

- Plunging ranula:
 - mucous retention cyst involving sublingual and submandibular salivary glands.
 - Presents as swelling in oral cavity and neck
 - management :- Excision of oral swelling + sublingual gland + aspiration of submandibular swelling
- Parotid swelling: On side of swelling, ear lobule is lifted up.

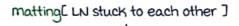
Tubercular cervical lymphadenopathy

00:34:44

00:39:09

- mc group involved: Level a lymph node(LN)
- Pathology:

Caseous necrosis → Periadenitis [LN wall inflamed]



Cervical Lymhadenopathy



LN mass filled with pus, adherent to deep fascia

Abscess cavities - below and above fascia i.e; Cold abscess in neck -" Collar stud abscess "

- Diagnosis :- Anti gravity aspiration → ZN staining
- management :- ATT

Carbuncle

- multiple follicular inflammatory lesion coalesce to form an abscess
- Location :- Nape of neck.
- Diabetic / immunocompromised patient
- management :- Antibiotics and drainage [Cruciate incision used]

Carbuncle



ULCERS

ulcer - breach in continuity of epithelium or mucous membrane

Types of ulcer

00:02:24



Punched out edge :- Arterial ulcer
- Neuropathic/Trophic ulcer



Sloping edge :- Healing ulcer - Venous ulcer



undermined edge :- Tuberculosis

- Rolled-out, pearly white edge :-Basal cell carcinoma [Rodent ulcer]



Raised, everted cauliflower like edge :-Squamous cell carcinoma

Varicose ulcer

00:05:29

- · mc site :-
 - Gaiter area [close to medial malleolus]
- Theory: Ambulatory venous hypertension theory
- · Precursor lesion :-

Lipodermatosclerosis

- Chronic venous insufficiency \Rightarrow Fat obliterates and skin becomes shiny .
- · "Inverted champagne bottle" appearance
- 10C :- Duplex scan









CEAP classification

00:07:31

- Telangiectasia :- Vessel diameter = < Imm
- Reticular veins :- < 3 mm
- Varicose veins :- > 3 mm

Clinica	al Classification (C)	Etiolo	gic Classification (E)
C _o	No visible/palpable	E,	Congenital
	signs of venous disease	E,	Primary
C,	Telanglectasias or reticular veins	E,	Secondary (postthrombotic)
C,	Varicose veins	E,	No venous etiology Identified
C,	Edema	Anato	mic Classification (A)
C _{4s}	Pigmentation and/or eczema	A,	Superficial veins
		A,	Perforator veins
C _{4b}	Lipodermatosclerosis and/or atrophy	A _d	Deep veins
C,	Healed venous ulcer	A,	No venous location identified
C,	Open venous ulcer	Pathophysiologic Classification (P)	
-		P,	Reflux
	Subscript	P.	Obstruction
A	Asymptomatic	Pu	Reflux and obstruction
S	Symptomatic	P.	No venous pathophysiology identifiable

- Features of varicose ulcer: Shallow ulcer, sloping edges
 - Pale granulation tissue
 - Pigmented margins
- Management :- Bisgaard's regimen → Education
 - → Elevation of limb
 - → Elastic compression stockings
 - → Dressings
 - → Surgery for varicose veins
- Long standing ulcer :- marjolin's ulcer ← malignant change
 Usually SCC

Arterial ulcer

00:12:48

- · Due to arterial insufficiency.
- · Features Punched out edges; Non-healing.
 - Floor : slough
 - Absent pulsations
- Diagnosis :- Duplex scan
- management :- Treat underlying cause

- Features :- Painless
 - Punched out edges
 - Pale granulation; Non-healing
 - Chronic → margins become fibrotic
- Causes: Leprosy; Diabetes; Neurological disorders
- Common in weight bearing areas Eq :- Sole
- Management :- Treat underlying cause
 - Debride ulcer → Flap to cover ulcer

warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with marrow Edition 4 videos.

Diabetic ulcers

00:17:39

00:14:50

- Combination of microangiopathy
 - Accelerated atherosclerosis
 - Neuropathy
 - Sugar concentration in tissue

Predisposing to

Infection

Ball of 1st toe In weight bearing areas Heel

- Non-healing, painless ulcer
- Bone → Can cause osteomyelitis
- Stages :-
- inflammation but no breach of skin
- → Breach, but superficial
- III) → Deep ulceration
- IV) → Bone involved
- management :- Control of diabetes
 - Local debridement
 - Antibiotics
 - Dressings



Stages of Diabetic Ulcers

vacuum assisted closurg(VAC) dressing

[negative pressure dressing]

 If osteomyelitis + with non-healing diabetic ulcer → Amputation

- > 30 mm Hg constantly, for prolonged period of time
- mc site :- Ischium > Greater trochanter
- Features: punched out, erode till bone, non-healing ulcer tendency
- Staging:-1) Non-blanchable erythema without breach
 - 11) Partial thickness \rightarrow Epidermis and dermis involved
 - III) Dermis/sub-cutaneous tissue
 - IV) muscle/Bone
- management:-
 - Remove pressure
 - Debridement
 - Dressings
 - VAC dressing



- Flap: TFL [Tensor fascia Lata] flap → mc flap for bedsores → Based on 'lateral circumflex femoral vessels'
- Prevention :- patient turned at least for 10 min every a hours
 Air/Water mattresses used

INSTRUMENTS

Linear stapler / linear cutter:

- uses :- Bowel anastomosis
 - · Sleeve gastrectomy
- if bleeding occurs along staple line → oversew with suture
- if stapler cartridge doesn't fire

the part gets cut & not stapled



Circular stapler:

- uses:
 - · Stapled haemorrhoidopexy
 - · Low anterior resection
 - Oesophago Jejunostomy



Needle holder:

- Criss - Cross serrations with

a groove

So that needle is stable while taking a bite.



Needle

swaged end

Pointed end

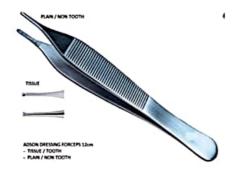
Correct place to hold the needle: 1/3rd from swaged 9 a/3rd from pointed end.

Forceps:

- Plain / Non tooth :

Uses : Places where trauma is to be avoided

- · Bowel
- · CBD
- ureter



Active space

42 General Surgery

10

- Toothed:

uses: To grip a tough structure

- Skin
- Fascia
- Sheath



3 instruments for skin suturing: Needle holder, Tooth forceps, straight scissor.

Russian forceps:

Used for : Neck dissection Axillary clearance Advantage : Strong grip over tissue

serration on the handle part for better finger grip.



Bard parker handle:

used to mount the blades

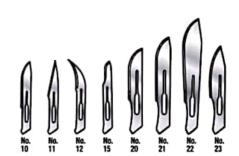


Blades:

- Blades 10, 15, 20, 21, 22, 23
All have a belly.

used for making Incisions

- Blade II Pointed →
 Stab blade → used for I \(\frac{1}{2} \) D
- Blade 12 → Curved front
 - → suture removal



 In OT, Always pass blades in a Kidney tray → prevent injury to surgical staff.

On passing the blade back to the nurse \rightarrow pointed end of the blade is facing the surgeon

Whenever incision is made, blade should be perpendicular to skin edge (slanting blade = 8evelede edge)

" Incision is always made from far to near "

Artery forceps:

Types—Straigh

- · Transverse serrations present
- Uses: to stop the bluder
 Smallest artery forceps K/a
 mosquito artery forceps



Babcock tissue forceps:

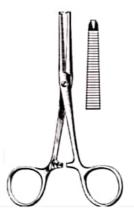
- a cups with gaps
- uses: Holding tubular structures
 (appendix, fallopian tube)

Prevent crushing.



Kochers tissue forceps:

- One side a teeth, other side I tooth
- uses: To hold tough structure.
 - Sheath
 - · fascia
 - Cervix in hysterectomy

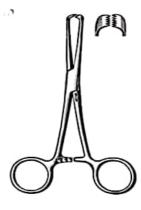


Allis forceps:

 multiple teeth on both sides which interlock with eachother.

Uses: - Holding touch structures

Skin edges – mastectomy, Thyroidectomy



Active space

44 General Surgery

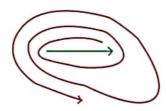
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Ramples sponge holder:

 used for holding gauze / sponge for painting the surgical area.

Cleaning: Clean the incision site & go circumferentially outward





Refractors:

- Non self retaining refractors
 - Langenback's retractor
 - solid 90° angle at one end.
 - used for retraction superficial tissue



- · Zerny / Army navy retractor:
 - One side solid handle → for superficial tissue
 - Other side a hooks with gap→ for superficial tissue but can suture between them.



· Cat's Paw retractor : usc. For superficial tissue.





Instruments in laparoscopic surgery:

To create pneumoperitonium:

- · Open method / Hasson method
- Veress needle: Spring loaded instrument with beveled edge.
- Stop valve → Helps to regulate the flow of co,



To know if needle is in peritoneal cavity:

Drop Test: Drop of saline at the opening of needle, if drop gets sucked in → needle in peritoneal cavity Saline method: Inject 10 cc saline → freely go through & cannot aspirate the saline back.

 Laparoscopic trocar: used to insert laparoscopic instruments into cavity



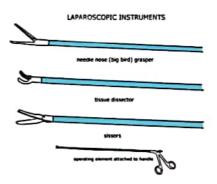
- SILS Port (Single incision laparoscopic surgery port)
 - single port has 3 channel

multiple instruments can be inserted.

Cosmetically superior



- Incision 15mm infraumbilical incision
 - Disadvantage / complication High chance of umbilical hernia



- Big bird grasper
- maryland's tissue disector
- Sissors

only tip of instrument exposed, rest of the parts are Black

- Insulation
- · to prevent glare in body cavity

Capacitance - electric leak due to

break of insulation

Burn undesired

structure.

Bowel clamp - Non traumatic:

- No teeth
- Used at the bowel ends during anastomosis.



Periosteal elevator:

mainly used in orthopedic procedures



 a retractors used for surgery.



Humbys Knife



Electric dermatome

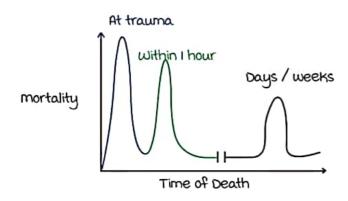


- used for split thickness skin graft
- Thickness 0.005 0.01a inches
- Punctate hemorrhage + → graft is of right thickness
- meshing / scoring of the graft: ↑ surface area of graft
 prevent seroma

BASICS OF TRAUMA MANAGEMENT

Trimodal distribution

00:00:26



Cause of death:

- → Immediately after trauma
- (1) Severe head injury (mc cause)
- (a) Transection of great vessels.
- → Death within I hour of injury
- (1) Airway obstruction
- (a) Tracheobronchial injury Airway causes
- (3) Open pneumothorax
- Breathing causes (4) Tension pneumothorax
- (5) Acute circulatory arrest
- (6) Haemothorax
- (7) Cardiac tamponade

Circulatory Causes

- → Death after days / weeks
- (1) Delayed head injury.
- (a) Sepsis.
 - 'Golden hour'



1st hour after trauma

Proper intervention can prevent trauma.

'Platinum minutes'

1st 10 minutes after trauma.

Triage

00:04:40

```
multiple casuality event
                                          mass casuality event
multiple people injured
                                          multiple people injured
Number ages not overwhelm
                                          Number overwhelms
medical facilities available
                                         medical facilities available
                                       Example: earthquake, floods
                                                 bomb blast.
Principle of triage:
"Save as many in as little time as possible.
Colour coding in triage:
Red → urgent intervention → (1) Airway obstruction
                             (a) Tracheobroncheal injury.
                             (3) Open pneumothorax
                             (4) Tension Pneumothorax
                             (5) Acute circulatory arrest
                             (6) Haemothorax
                             (7) Cardiac tamponode
update: Flail chest removed from this category.
Yellow \rightarrow Admitted, stabilised \rightarrow (1) Fractures
          Intervention can wait
                                   (a) moderate head injury.
Green → "Walking Wounded" → (1) minor Bruises
                                   (a) Laceration
           require -
Black → Dead bodies / moribund patients.
           segregated
```

Advanced trauma life support (ATLS)

00:10:54

- · Based on principle : ABCD
 - A → Airway management
 - 8 → Breathing Management
 - $C \rightarrow Circulation$.
 - $D \rightarrow D$ isability management.

```
exception : c ABCD
      Done in "field settings" Eg: war field
   c \ensuremath{\,\rightarrow\,} control of exsanguinating hemorrhage .
In BLS (advanced cardiac life support) > CAB ' principle tollowed
pre hospital management:
   On transporting patient, information collected from:
Ambulance driver
                                                         Patient
m → mechanism of injury
                                              A → Allergies
 1 → Injuries
                                              m → medical condition
 S → signs and symptoms
                                              P → Past history
 T → Treatment given
                                              L → Last meal
                                              € → Events leading
                                                    to trauma.
                              ATLS
    Primary survey
                                              secondary survey
                                              detailed survey
 ABCD + life threatening injuries
                                          search for all other injuries
Airway
- Airway obstruction
- Tracheo bronchial tree injury
Breathing
- Tension pneumothorax
                                         minimum: 4 people required
- Open pneumothorax
                                    in limb fracture : 5 people required
Circulation
- massive hemothorax
- Cardiac tamponade
- Traumatic circulatory arrest
```

Airway: Cervical spine injury

00:17:17

→ Cervical spine stabilised 1st before managing airway.

to avoid cervical injury during intubation.

- removal of helmet in cervical

a person procedure.

injury patient.



- → Precautions taken during transfer of cervical spine patient.
- (1) Done on hard board
- (a) supine position

strap → head, thorax & pelvis.

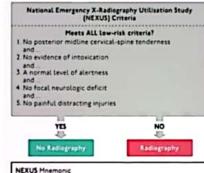


(3) Prone position → unconcious patients → Prevents aspiration Lateral position → not done.

Nexus Criteria

00:20:10

- → Assesment of cervical injury.
- → Nexus National Emergency X- radiography Utilization Study
- → Nexus mnemonic.
 - N Neuro deficit
 - E Et OH (alcohol) / intoxication
 - x Extreme distraction injuries.
 - u unable to provide history (altered level of conciousness)
 - S Spinal tenderness (midline)



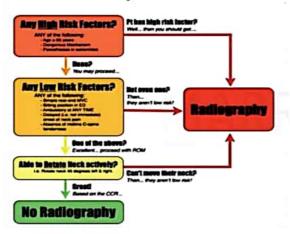
NEXUS Mnemonic N- Neuro deficit
E- EtOH (alcohol)/intoxication
X- eXtreme distracting injury(ies)
U- Unable to provide history (attered level of consciousness
S- Spinal tenderness (midline)

- → If any features present

 ↓

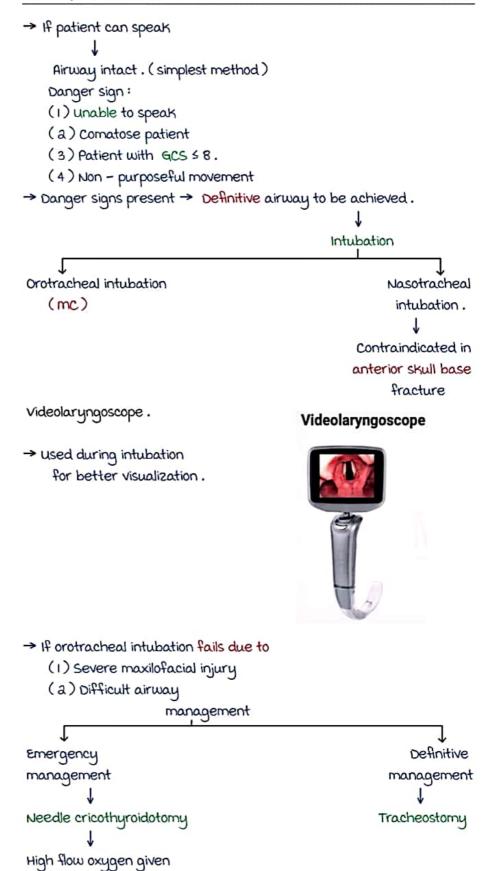
 Indicates cervical injury
- Stabilize cervical spine → Hard philadelphia collor.
- Imaging of cervical spine.
 (minimal x ray)
- → If factors are absent
- Imaging of cervical spine not required
 Canadian C spine rule.
- → For assesment of cervical injury.

Canadian C Spine Rule



ASIA (American Spinal Injury Association) Impairment scale . For assesment of spinal cord injury .

A	Complete	No sensory or motor function is preserved in sacral segments S4-S5
В	Incomplete	Sensory, but not motor, function is preserved below the neurologic level and extends through sacral segments S4-S5
С	Incomplete	Motor function is preserved below the neurologic level, and most key muscles below the neurologic level have muscle grade less than 3
D	Incomplete	Motor function is preserved below the neurologic level, and most key muscles below the neurologic level have muscle grade greater than or equal to 3
E	Normal	Sensory and motor functions are normal



- Quick procedure
- 'Y' connector used

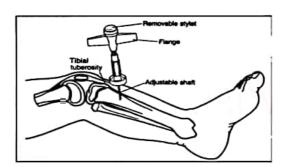
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High flow oxygen of 15 lts / minute
- Y connector kept → 1 second on and 4 second off.
→ After 15 - 30 mins
   Co retention
  Surgical cricothyroidotomy
  avoided in patients < 12 years
  causes: subglottic stenosis.
Breathing and circulation
                                                               00:28:57
 Breathing.
                           rule out (1) Open / tension pneumothorax
(1) chest examination
                                   (a) Cardiac tamponade
  - Inspection .

    Palpation

  - Percussion
  - Auscultation .
(a) pulse oximetry (adjunct)
Circulation:
    Insertion of a large bore IV lines
      minimum 18 G needle.
→ Patient dehydrated → 16 G / 14 G needle used.
→ IV line insertion not possible (shock)
                                              Definitive management
Emergency management
venous cut
                             intraosseous
                                                         Central line
 down
                             insertion
                                                         insertion
Great saphenous
                          needle insertion
                                                          mc vein
   vein
                         below tibial tuberosity
                                                      Internal jugular
                                                           vein
                            IV Fluids / blood
```

done in any age group

Intraosseous insertion.



updates in ATLS:

- → Judicious fluid therapy.
 - 1Lt of fluid instead of a Lts
- → Damage control resuscitation :
 - Anticipate and treat traumatic coagulopathy.
 - (a) Control permissive hypotension.
 - (3) Limit crystalloid infusion

Prevent: Dilution coagulopathy.

(4) Damage control surgery.

Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with marrow Edition 4 videos.

Crash - 2 Trial

00:35:54

→ Role of Tranexamic acid.

"significantly reduce mortality in adult trauma patients" Dose: I g over first 10 minutes.

followed by

1 g over 8 hrs

- → Indications:
 - (1) significant hemorrhage
 - (a) SBP (systolic blood pressure) < 90 mmHg
 - (3) Heart rate > 110 beats / min
- → In a trauma patient

Rapid fluid infusion is not a substitute for controlling bleeding.

Disability managemen

Glasgow coma score.

- → Includes mainly 3 responses:
 - (1) Eye opening.
 - (a) verbal
 - (3) motor response → most sensitive

BEHAVIOR	RESPONSE	SCORE
Eye opening	Spontaneously	4
response	To speech	3
	To pain	2
	No response	2.0
Best verbal	Oriented to time, place, and person	
response	Confused	4
	Inappropriate words	3
	Incomprehensible sounds	2
	No response	
Best motor	Obeys commands	96
response	Mores to localized pain	5
	Flexion withdrawal from pain	4
	Abnormal flexion (decorticate)	3
	Abnormal extension (decembrate)	3
	No response	1

- → minimum score: 3; maximum score: 15
- → V₃ → verbal response in head injury patients (mc)

Inappropriate words.

mumbling sounds (Eg: aa, maa)

voomprehensible so

Incomprehensible sound V

 $V_{\tau} \rightarrow 1$ patient is intubated \rightarrow score 1 added.

Abnormal flexion to painful stimuli

Decorticate rigidity (m.)

Abnormal extension to painful stimuli

Decerebrate rigidity (m₂)

Highest motor response - to be recorded.

GCS - P score and GCS - PA score

00:49:53

GCS - P score.

pupillary response score not added to GCS score.

Pupillary response / reactivity score.

- (1) 0 → If both pupils are reacting
- (a)1 → Any one pupil reacting.
- (3) a → Both pupils not reacting.
- → GCS PA score

Age of patient assesed.

- younger age -> beter prognosis.
- → NT Non testables

In intubated patients verbal response cannot be assesed $\ensuremath{\mathsf{Written}}$ as $\ensuremath{\mathsf{Vnt}}$ in gcs score .

Ebb and Flow

Phase	Duration	Role	Physiological	Hormones
Ebb	<24 hrs	Maintenance of blood volume, catecholamines	Dec BMR, Dec temp, Dec O2 consump, vasoconst, Inc CO, Inc heart rate, acute phase proteins	Catechol, Cortisol, aldosterone
Flow				
Catabolic	3 – 10 days	Maintenance of energy	Inc BMR, inc Temp, Inc O2 consump, -ve N2 balance	Inc. Insulin, Glucagon, Cortisol, Catechol but insulin resistance
Anabolic (MOORE)	10 - 60 days	Replacement of lost tissue	+ve Nitrogen balance	Growth hormone, IGF

Phases:

(1) Ebb phase.

Occurs < 24 hrs of injury.

for maintainence of blood volume and energy conservation.

- (1) & Basal metabolic rate.
- (a) ↓ Thyroid hormones.
- (3) ↓ Oxygen consumption.
- (4) \$\int \text{Body temperature}.
 Hormones required:
- (1) Catecholamines
- (a) cortisols
- (3) Insulin.

Proper resuscitation

1

Reduced duration of Ebb phase.

(a) Flow phase

Catabolic phase

Anabolic phase

- → 3 10 days after trauma
- → 10 60 days after trauma
- → Basal metabolic rate
- → Positive nitrogen balance
- → Temperature increases
- → Hormones
- → Negative nitrogen balance Hormones.
- (1)↑Insulin
- (1) Thyroid hormone
- (a) ↑ Growth hormones.

(a) 1 Insulin (Insulin resistance in organs)

Updates 00:56:14

(1) RTS - Revised trauma score

Includes:

- → Gcs score
- → Systolic blood pressure
- → Respiratory rate.
- (a) TRISS Trauma and injury severity score.

Includes:

- → Revised trauma score
- → mechanism of injury
- → Age
- → ISS Injury Severity score

Assesment of injury in various organs.

(3) mess

severity score.

Includes:

- → Type of injury.
- → Shock
- → Ischemia
- → Age group
- · If mess score:
 - 56 Salvagable limb.
 - ≥7 Amputation.



Type	Characteristics	Injury	Point
1	Low energy	stab wound, simple closed fx, small-caliber GSW	1
2	Medium energy	Open/multilevel fx, dislocation, moderate crush	2
3	High energy	shotgun, high-velocity GSW	3
4	Massive crush	Logging, railroad, oil rig accidents	4
Shoc	k Group		
1	Normotensive Transiently	BP stable	0
2	hypotensive Prolonged	BP unstable in field but responsive to fliud SBP <90mmHg in field and responsive to IV fluids	1
3	hypotension	in OR	2
Ische	mia Group		
1	None	Pulsatile, no signs of ischemia	1
2	Mild	Diminished pulses without signs of ischemia No dopplerable pulse, sluggish cap refill,	2
3	Moderate	paresthesia, diminished motor activity	3
4	Advanced	Pulseless, cool, paralyzed, numb without cap refill	4
Age (Group		
1	<30y/o		0
2	>30 <50		1

Active space

ABDOMINAL TRAUMA

m.c organ injured:

I. Overall : Spleen

a. blunt trauma : Spleen > Liver > small intestine

3. Penetrating trauma : Liver > small intestine > Diaphragm

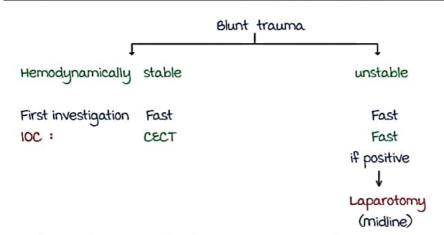
4. Gunshot wound (GSW) : Small intestine > colon > Liver

5. Seat belt syndrome : mesentery6. Deceleration injury : DJ Flexure

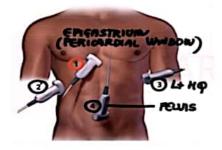
7. Children : Spleen > Kidney.

Blunt trauma to abdomen

00:03:47



FAST (Focused Assessment with Sonogram in Trauma)



Advantage:

Fast (done in a-5mins)

Quadrants assessed:

1: Epigastrium (100K for : cardiac tamponade)

a: (R) hypochondrium (liver injury)

3: (L) hypochondrium (Spleen injury)

4 : Pelvis

eFAST (extended FAST)

- FAST + thoracic cavity assessment

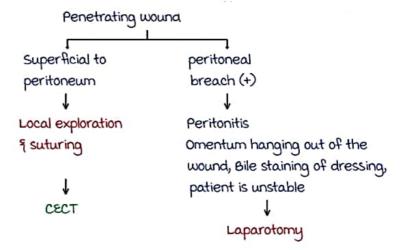
- 4 quadrants + left & right thoracic cavity = 6 quadrants
- aka BOAST (Bedside Organ Assessment with Sonography after Trauma)



→ FAST + ve. if ↑ Hypoechoic area

Penetrating abdominal trauma

00:09:38



DPL - Diagnostic Peritoneal Lavage.

- . Indication:
 - Hemodynamically unstable patient → When FAST not available
- · Procedure:

Empty bladder (Foley's) & Stomach (Ryle's tube)

Introduce catheter below umbilicus

First aspirate : > 10 cc of frank blood

if no Blood aspirated Laparotomy Instill 1L of RL

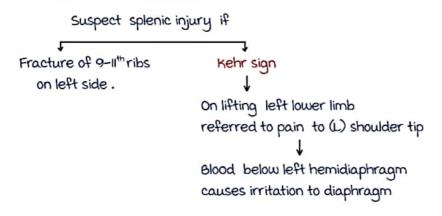
Aspirate

+ ve DPL If:

a) > 1 Lakh RBC /mm³
b) > 500 WBC /mm³
c) > 175 IU / L [s . Amylase]
d) Faecal matter , food particles , Bile
Laparotomy
Drawbacks of DPL
cannot assess : Retroperitoneal trauma and renal injury

Splenic injury

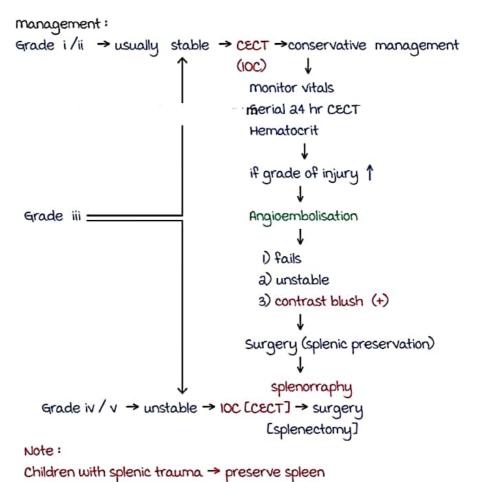
00:16:34



Grades of splenic trauma

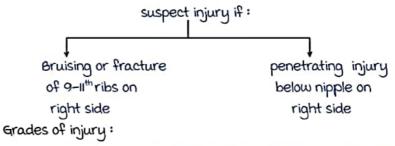
Table 1. Simplified Version of the Splenic Injury Scale of the American Association for the Surgery of Trauma

Grade	injury Description		
ı	Laceration <1 cm parenchymal depth or subcapsular hematoma <10% of surface		
II	Laceration 1 to 3 cm or subcapsular hematoma 10% to 50%		
Ш	Laceration >3 cm or subcapsular hematoma >50%		
IV	Laceration to segmental or hilar vessels with significant devascularization (>25% of spleen)		
V	Completely shattered spleen or hilar injury with complete devascularization		



Liver injury

00:24:07



Grade	Description of injury		
Į.	Hematoma: subcapsular, <10% surface area Laceration: capsular tear, <1cm depth		
"	Hematoma: subcapsular, 10-50% surface area; intraparenchymal <10cm dlameter Laceration: capsular tear, 1-3cm depth, <10cm length		
111	Hematoma: subcapsular, >50% surface area of ruptured subcapsular or parenchymal hematoma; intraparenchymal hematoma >10cm or expanding Laceration: >3cm parenchymal depth		
IV	Laceration: parenchymal disruption involving 25-75% hepatic lobe or 1-3 Couinaud segments		
V	Laceration: parenchymal disruption >75% hepatic lobe of >3 Couinaud segments within single lobe Vascular: juxtahepatic venous injuries (retrohepatic vena cava / central major hepatic veins)		
VI	Vascular: hepatic avulsion		

management Grade i,ii,iii → Conservative. Grade iv ,v,vi, → unstable exploration

4 P's in liver trauma management

Push: Bimanual compression / pressure

Pringles

Plug: Sengstaken - Blakemore tube insertion

Pack: place packs /mops for 24-48 hours

Re -explore

Pringle manoeuvre: 15 - 20 mins in one sitting. Compress hepatic pedicle at foramen of Winslow.



- If hepatic artery bleed not controlled → Ligate but
 - Portal vein injury → Repair
- CBD injury → Repair and insert T-tube
 Note: Do not fill liver defects with omentum.

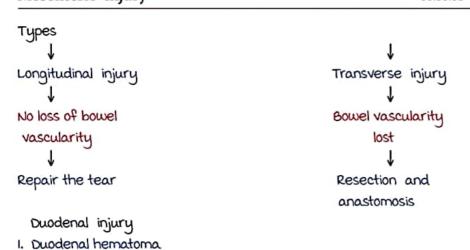
complications of liver injury:

- 1. Hemorrhage
- a. Bile leak
- 3. Abscess
- 4. Biliary strictures.

Mesenteric injury

- Bowel rest

00:33:38



Surgery • v2.0 • Marrow 4.0 • 2020

- Ryle's tube → NPO

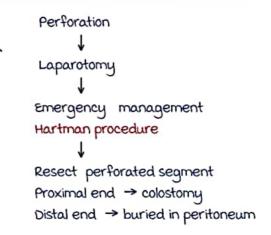
a. Perforation (Duodenal)
Omental (Graham) Patch Repair

Pancreatic injury secondary to blunt Trauma. most important prognostic factor → Disruption of main pancreatic duct (MPD) I Parenchymal injury MPD disrupted but duct (N) Distal pancreas involves head Conservative involved and neck management Beger procedure Distal pancreatectomy

Colonic and rectal injury

00:39:00

(Duodenum preserving pancreatic head resection)



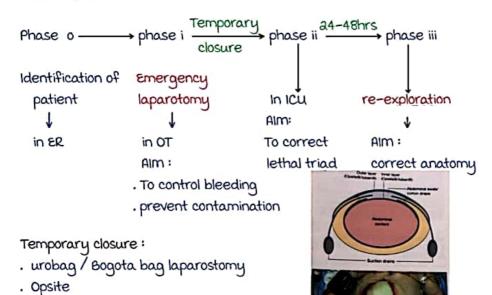
Damage control surgery (DCS)

00:41:18

A/K/A abbreviated laparotomy
Indication: Lethal triad of trauma
Coagulopathy

Hypothermia
Acidosis

Phases of DCS:



Stages of DCS

- 1. Patient selection
- a. Control of hemorrhage and contamination
- 3. ICU Care
- 4. Definitive surgery
- 5. Abdominal closure

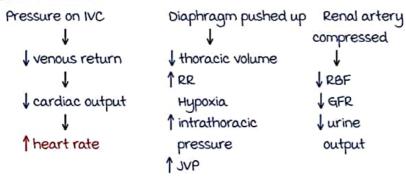
Abdominal compartment syndrome

00:47:36

Causes: 1. Severe burns → Gut distension

- a. Bowel obstruction
- 3. massive ascites
- 4. Abdominal trauma

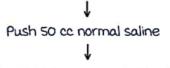
Clinical features:



Bladder pressure:

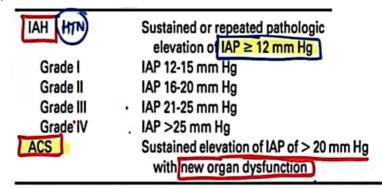
marker of intra -abdominal pressure.

To measure intra - abdominal pressure:
Insert Foley's f drain bladder



Connect to pressure apparatus

Grades:



management:

- 1. Correct acidosis
- a. IV fluids
- 3. Decompressive laparotomy.

THORACIC TRAUMA

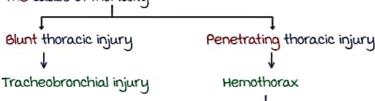
Thoracic Trauma

00:00:14

- → Thoracic trauma cause → > 50% trauma deaths
- → In 80% thoracic injuries

management: Conservative (Chest tube)

- → Causes Hypoxia (Serious consequence of thoracic trauma)
- -> mc cause of mortality



Secondary to pulmonary laceration

Investigation:

- First: X-Ray chest AP view
- Emergency: eFAST

Thoracic injuries

Immediately life threatening

potentially life threatening

- 1. Airway obstruction
- a. Tension / open peumothorax
- 3. Pericardial tamponade
- 4. Massive haemothorax
- 5. Tracheo bronchial injuries

- ↓
- Aortic injuries
 Flail chest
- 3. myocardial contusion
- 4. Rupture of diaphragm
- 5. Oesophageal injuries
- 6. Pulmonary contusion.

Rib Fractures and Flail Chest

00:03:51

Rib fractures:

- → mc thoracic trauma.
- → mc in adults
- → In children → Ribs are more pliable
 - Internal damage occurs
 - Fractures are uncommon.

- → Analgesics.
- → No strapping
- → High velocity impact causes:
 - → 1st rib fractured

uncommon

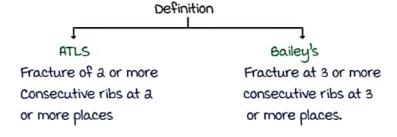
- → 10 12th rib fracture
- · If 1st fractured, suspect injury to
 - I. Subclavian vessels
 - a. Brachial plexus
 - 3. Apex of lungs
- In 10 1ath rib fracture → Floating ribs.

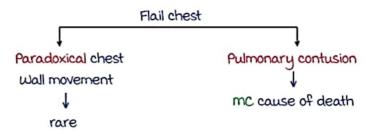
Injury to: 1. Left spleen

a. Right liver.

→ mc ribs Fractured during CPR → 4th - 5th ribs.

Flail chest.





management:

1st Line: Adequate analgesics (thoracic epidural) and oxygenation

If po < 60 mmHg, respiratory > 20/min.

IPPV - Intermittent positive pressure ventilation

↓ Fails

Surgical Correction of flail chest.

Tension pneumothorax

Definition: pneumothorax with rapid hemodynamic compromise

Conditions:

1. Pulmonary laceration / Injury (mc)

IPPV given without a chest tube insertion

Indication of chest tube (before IPPV)

- → Suspected lung injury
- → Subcutaneous emphysema
- 2. Tracheo Bronchial injury
- Open pneumothorax → Sucking wound in chest wall

> a/3rd circumference of trachea

→ In penetrating chest wall injury

One way valve formed

Air accumulation causes

Same side : Lung collapse

opposite side: Hyperinflation of lungs

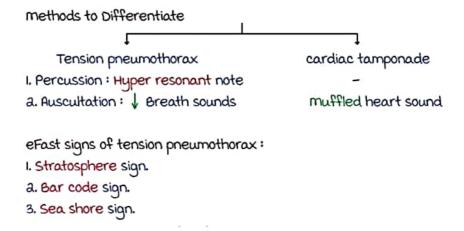
mediastinal Shift

Compression over heart

Hemodynamic Changes

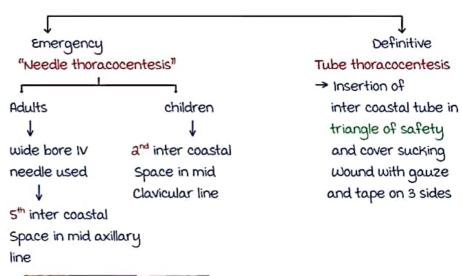
Clinical features:

- 1. 1 Respiratory rate.
- a. \downarrow Co = \uparrow Heart rate $\times \downarrow$ SV \uparrow Cardiac tamponade.
- 3. 1 jugular venous pressure
- 4. On percussion → Hyper resonant.
- 5. Absent breath sounds
- These changes rapidly develops in minutes
- Both tension pneumothorax and cardiac tamponade are clinical diagnosis



Management of pneumothorax

00:22:53







Tension pneumothorax

Tube thoracocentesis

Simple pneumothorax

- → No hemodynamic compromise.
- → management :
 - Needle insertion not required.
 - · Direct ICT insertion if indicated.

Hemothorax 00:27:38

- → Accumulation of blood in pleural space
- → Source: Intercostal vessels
- → Clinical features:
 - ↓ Cardiac output
 - ↓ Systolic blood pressure.
 - 1 Heart rate.
- → On examination:
 - Absent breath sounds on side
 - · Percussion : Dull note



Investigation:

X-ray: Air fluid level seen

management:

ICT insertion in triangle of safety.

- → Indications of emergency thoracotomy:
 - 1. Output > 1.5lts Blood at time of ICT insertion
 - a. > 200 cc/hr for 3 consecutive hours
 - 3. Cardiac tamponade
 - 4. Thoracic aortic injury
 - 5. Tracheo broncheal injury
 - 6. Esophageal rupture
- → Indications of emergency room thoracotomy:
 - 1. Open cardiac massage
 - a. massive air leak
 - 3. massive bleeding

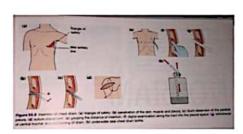
Chest tubes

00:33:02

→ Inserted in triangle of safety

Boundaries:

- Anteriorly: Anterior axillary fold
- a. Posteriorly: Posterior axillary fold
- 3. Apex: Axilla
- 4. Base: 5th inter costal space.



- → Always inserted at upper border of lower rib
- Other end of chest tube connected to under water seal (Submerged under water)

Air comes out as bubbles Air does not move back to lungs.

→ If column of water moves up and down with each breath in under water seal.

It confirms right/correct positioning of chest tube

Positioning of chest tube on x-ray

00:37:47

 Correct position is when all holes of chest tube are inside thoracic cavity



- → Stopped column movement : Blocked / displaced tube (clot)
- → ICT removed when:
 - 1. Lung expands → Breath sound present
 - a. Output < 100 cc / a4 hrs
 - 3. In chest x-ray Lung has expanded
 - 4. At peak of inspiration, when patient holds breath

Traumatic Aortic injury

00:43:09

Site:

- 1. Distal to ligamentum arteriosum (mc)
- a. Left subclavian

Clinical features:

1. Difference in blood pressure

Between both limbs

a. Absent pulsations in unilateral limb



Investigation:

- · Chest x-ray
- 1. Wide mediastinum.
- a. Depressed left main bronchus
- eFAST
 Collection in thoracic cavity

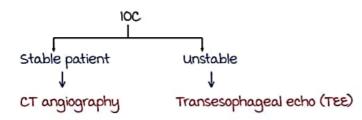
management:

- I. Permissive hypotension
- → Rupture of aorta → ↓ Systolic blood pressure BP should be maintained at lower limit of normal
- a. Esmolol (eta Blocker)

To maintain

- 1. Heart rate < 80 bpm
- a. mean arterial pressure 60 -70 mmHg
- 3. Surgery → Graft repair





Cardiac tamponade

00:48:19

- → Rapid accumulation of blood in pericardial space.
- → Cause: penetrating trauma

With 60 - 75 cc of blood

- → Clinical features:
- ↓ Cardiac output = ↑ Heart rate X ↓ ↓ SV
- · 1 JVP
- Kussmaul sign present
- · muffled heart sounds

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- · Beck's triad
- 1. muffled heart sounds
- a. 1 JVP
- 3. Hypotensior.

Investigation:

FAST or eFAST

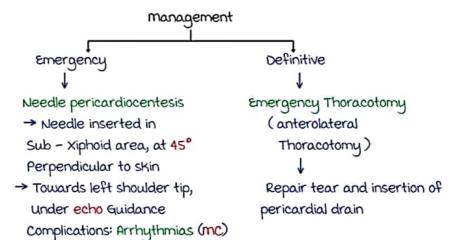
placed on

Epigastrium → Look for cardiac

tamponade

Blood in pericardial space (Hyper echoic)

Positive FAST



Even if 10cc 6100d aspirated -> There is dramatic improvement in Hemodynamic profile

Sternal Fractures

00:54:45

- → uncommon
- → High velocity impact required
- → Suspect: myocardial contusion

management:

monitor: 1. Cardiac enzymes

a. Serial 12 Lead ECG's

Traumatic diaphragmatic injury

- → causes:
 - 1. Blunt abdominal trauma
 - a. Penetrating thoracic injury
- → Left side more common Left side > right side
- → Clinical features:
- 1. Delayed / Silent presentation
- a. Breathlessness



- → On examination:
- breath sounds
- · Bowel sounds present in thoracic cavity

Investigation:

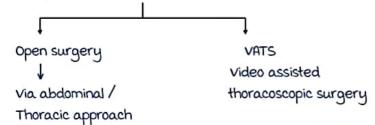
On x-ray:

Ryles tube / orogastric tube

\$

Coils up in thoracic cavity

management:



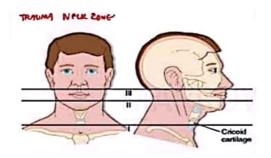
→ Repair diaphragm using prolene sutures and Chest tube insertion.

Junctional zone:

- → Area between nipple and till rib cage end
- → Injuries can cause both thoracic and abdominal complications

Neck trauma 01:00:40

Trauma neck zone



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Zone 1: Thoracic inlet to upper border of cricoid cartilage.

- → Vital structures present.
- → Associated with maximum mortality

Zone a: Cricoid to angle of mandible

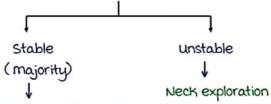
- → most exposed area.
- → Prone for injury (mc)
- → most surgically accessible zone

Zone 3: Angle of mandible to base of skull

→ major vessels present

management:

→ management of zone a patients



Conservative management

→ In zone I and zone 3

Angiography, angio embolization

if fails

Neck exploration

- → Hard signs of neck trauma.
- 1. Air bubbling from a penetrating injury.
- a. Neurological deficit
- 3. Expanding haematoma
- Absent pulsations
- 5. Severe haemorrhagic shock

Resistant to fluid therapy

HEAD TRAUMA

· Head trauma is the leading cause of death in patients with trauma

Surgical anatomy of scalp

00:00:25

Skin

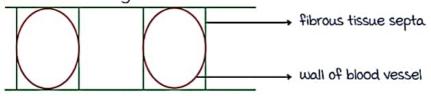
Connective tissue

Aponeurosis

Loose areolar tissue

Periosteum.

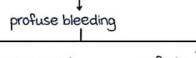
· Connective tissue layer



Blood vessel wall is adherent to fibrous septae

Laceration

vessel cannot undergo vasoconstriction



Emergency management

Definitive management - apply pressure

- Suturing
 - Silk /nylon
 - · No. 1/1-0
 - cutting needle
- removed: 5 7 days

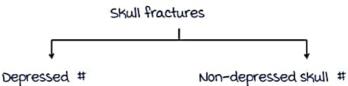
- Aponeurotic layer
 - Subaponeurotic bleeding: black eye / raccoon eyes



- · Loose areolar tissue
 - emissary veins: can carry retrograde infection and cause cavernous sinus thrombosis
- Periosteal layer
 - skull fractures

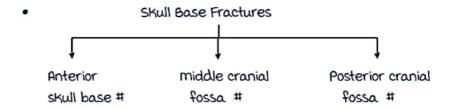
Skull fractures

00:04:45



- Treated as compound #
- Conservative management

- Antibiotics
- Indications for surgery
 - Focal neurological signs
 - depressed more than thickness of adjacent skull.



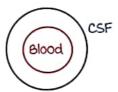
- Anterior cranial fossa #
 - Cribriform plate #
 - Clinically, epistaxis

 CSF Rhinorrhoea

 Clinical
 Halo / Target sign

 to differentiate

 Biochemical
 Ba transferrin in CSF



- Other clinical features:
- Black eyes / Raccoon eyes
- Frontal lobe contusions
- · Anosmia

- middle cranial fossa #
 - # of petrous part of temporal bone
 - Clinically, CSF otorrhea
 - Haemotympanum
 - Battle sign
 - discolouration over
 mastoid seen a4 48h
 - · Facial nerve injury
 - · Temporal lobe contusion
 - · Paradoxical rhinorrhoea
 - collection in _____eustachian _____ middle ear tube nose



- # of occipital bone
- clinically,
- Visual disturbances
- · 6th cranial nerve injury
- Occipital contusion
- · Basilar artery injury
- Vernet syndrome : Jugular foramen syndrome

9 - 11th cranial nerve injury

- management of cranial fossa fractures
 - 1. 3rd generation cephalosporin
 - a. NCCT

NICE guidelines for head injury

00:13:13

- (i) Cervical spine injury should be suspected in all patients with head injury
- (a) GCS monitoring

first a hours → every 1/a hour

next 4 hours → every hour

After 6 hours -> every a hours

- (3) Indications to involve a neurosurgeon
 - 1. GCS ≤ 8
 - a. Unexplained confusion > 4 hours
 - 3. GCS falls after admmission

6. > a episodes of vomiting

- 7. seizures
- 8. Focal neurological signs
- 9. Cranial fossa #
- 10. Penetrating CNS injury

→ Indications for NCCT head

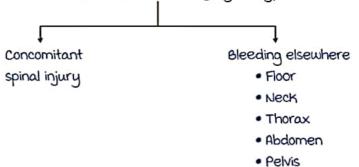
- (4) Indications for NCCT head
 - 1. GCS < 13 at any point
 - a. GCS < 15 after a hours of admission
 - 3. Age > 654
 - 4. Coagulopathies
 - 5. Dangerous mechanism of injury
 - 6. Retrograde amnesia > 30 minutes

Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with Marrow Edition 4 videos.

Brain injury

00:20:03

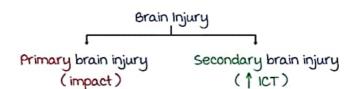
- · Can be compounded by hypoxia / hypotension
- · Isolated head injury will not cause hypotension till terminal stages.
- · If a patient with trauma has a head injury + hypotension



Grading of Brain injuries - GCS

minor → 15 / 15 without loss of consciousness
mild → 14 - 15 with loss of consciousness
moderate → 9 - 13

Severe → ≤ 8



I. Concussion

- mildest
- · Colorado classification

11 ----- amnesia

III — → loss of consciousness

- NCCT normal
- Post concussion syndrome (Chronic traumatic encephalopathy)

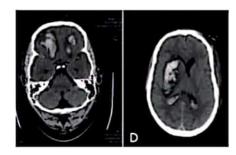
a. DAI: Diffuse Axonal Injury

- most severe
- shearing force between grey and white matter
- · Clinically, coma
- · NCCT normal
- Investigation of choice mRI: punctate hemorrhages at grey and white matter junction corpus callosum
- HPE, clubbed axons retraction balls.
- · Worst prognosis.

3. Intracranial hemorrhages

- · Contusion / Intraparenchymal
- · SAH
- · EDH
- · SDH

contusion / Intraparenchymal hemorrhage



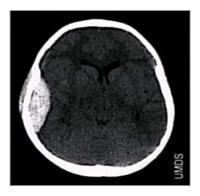
- most common traumatic brain hemorrhage
- site: temporal region more common frontal region.

84

- Investigation: serial CTs
- SAH subarachnoid hemorrhage
 - Trauma is the most common cause of SAH
 - majority of traumatic SAH → conservatively

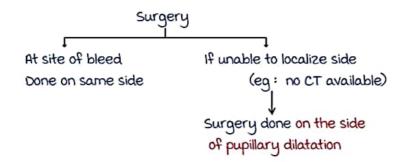
Extradural hemorrhage

00:33:47



- mostly arterial: middle meningeal artery
- Young patients
- · High velocity impact
- Clinically presents with lucid interval. It is not pathognomic of EDH. Seen in other brain injuries as well
- · Investigation of choice NCCT
 - Biconvex lens shaped bleed
 - bleeding is between skull and dura
- management:
 - Indications > 30 cc clot size
 - > 5 mm midline shift
 - > 1.5 cm thickness

Craniotomy (flap of bone)



False localizing sign: Kernohan notch phenomena
 example: Left sided EDH

 Temporal (uncal) herniation

 Left pupil dilated

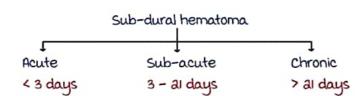
 Sometimes it can press on corticospinal tract of the opposite side (Right side)

 Left sided hemiparesis

Subdural hematoma

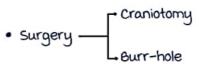
UU:43:14





- · Chronic subdural hematoma
 - elderly
 - venous
 - Cortical bridging veins
 - Clinical features

- Investigation of choice NCCT
 - · Concavo-convex (crescenteric) bleed
 - · Bleeding is between dura and arachnoid.
- management surgery
 - · Indications, > 1 cm thickness
 - > 5 mm midline shift
 - · other indications for surgery are:
 - 1. Fall in GCS > a points
 - a. Fixed / dilated pupil
 - 3. ICP > 20 mm Hg

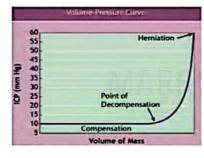


· Extent of brain damage, SDH > EDH

Secondary brain injury

00:48:10

- Occurs due to 1 ICT (intracranial tension)
- 1 ICT is due to edema
- Compounded by hypoxia hypercapnea hypotension.
- · monro Kellie doctrine



- States that brain has tremendous capacity to compensate (for an increasing mass or bleed), but once the point of decompensation is met, there can be sudden decompression and herniation of brain
- · Cerebral perfusion pressure (CPP)

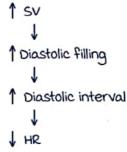
CPP ≥ 60 mm Hg

Cushing reflex → Bradycardia
 Hypertension
 Altered respiration

↑ ICP → ↑ MAP (mean arterial pressure)

↓
↑ Systolic BP

↓
↑ Cardiac output = HR × Stroke Volume (SV)



- · Variant of cushing reflex = Hypotension instead of hypertension
- Cushing ulcer → stress ulcer in acid producing area of stomach

Management

00:56:01

- management of raised ICT in head injury
 - 1. Adequate O.
 - a. Adequate perfusion by maintaining S&P ≥ 100 mmHg
 - 3. Avoid hyperglycemia: Avoid dextrose containing solution
 - 4. IV mannitol
 - Hyperventilation: only moderate amounts,
 if severe / sustained → not recommended
- Steroids → no role in management of ↑ ICT due to trauma
- Prophylactic antiepileptics -> doesn't reduce incidence of late post traumatic seizures (3-5%)
- Goals of Treatment in Head injury
 - ICP: 20 25 mmHg - CPP: ≥ 60 mmHg

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Trauma

- Pa0; ≥ 100 mmHg
- P,O,: ≥ 15 mmHg (Brain tissue O, tension)
- Serum Na* : 135 145
- Glucose: 80 180 mg/dL
- management of mild head injury
 - Evaluate
 - DO CT if indicated
 - Criteria to discharge
 - · GCS 15 / 15
 - normal CT
 - not under influence of drugs /alcohol
 - accompanied by responsible adult
- · management of moderate head injury
 - Admit
 - CT
 - monitor and do serial CECT
- management of severe head injury (≤8)
 - Intubation ⊕
 - NCCT

Glasgow Outcome Score

- 1. Death
- a. Persistent vegetative state
- 3. Severe disability
- 4. moderate disability
- 5. Good recovery

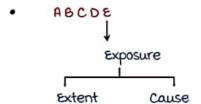
Brain death

- · Criteria for brain death
 - GCS = 3
 - non reactive pupils
 - Absent brainstem reflex
 - No spontaneous Ventilatory effort

THERMAL INJURIES

Burns 00:00:26

- · Indications to transfer patients to a burns unit
 - >10% partial thickness burns
- 3rd/4th degree burns in any age group
- Inhalational injuries
- Burns patients requiring IV fluids
- chemical /electric burns
- Burns involving sensitive areas, palms, soles, face, genitalia
- Burns + Trauma



· Airway:

- if inhalational burns are present or not
- Danger signs
 - · burnt / singed nasal hair
 - hoarseness of voice
 - carbonaceous deposits in sputum
 - burns in a closed room
 - burns involving head, face and neck
 - · altered mental sensorium

Breathing

- Can suffer due to
 - hypoxia.
 - · co poisoning
 - eschar around chest

Circulation

 extent of burns damage is proportional to inflammatory mediators released.

Leaky vessels persists till 12 hours after minor burns
 colloids like albumin are avoided for resuscitation

Burns: fluid resuscitation

area burns in children

00:10:35

- minor amount of burns → oral liquids (containing salt)
- · Parkland's formula for IV fluids
 - Ringer lactate (crystalloid)

4 x Body weight x TBSA burnt = Fluid requirement for

(kg) first a4 hours

1/2 given in Rest 1/2 given in
first 8 hours the next 16 hours

(a x BW xTBSA) (a x BW x TBSA)

TBSA - Total body surface area

- First degree burns are not included .
 It is calculated from the time of injury (burn)
- Children: Dextrose containing maintenance fluids given
 - 100 ml/kg in a4h for 10 kgs
 - 50 ml/kg in a4h for next 10 kgs
 - · ao ml/kg in a4h for every kg after ao kgs.

eg: aa kg child:

$$10 \times 100 \rightarrow 1000$$

$$10 \times 50 \rightarrow 500$$

$$2 \times 20 \rightarrow 40$$

Total dextrose = 1540 ml in 24 hrs

· Muir & Barclay formula (colloids)

0.5 x body weight(kgs) x TBSA = one portion 6 portions over 36 hours

ATLS formulae (for RL)

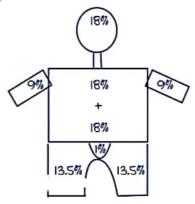
category	Age	Fluid rate	Target urine output
and/3rd degree	Adult	a × BW × TBSA	0.5ml/kg/hr
	child <144	3 x BW x TBSA	I'ml /kg/hr.
;	Infant	3 × BW × TBSA +	1 ml/kg/hr.
	Ш	maintenance fluids	
4th degree/	all ages	4 × BW × TBSA	1 - 1.5 ml/kg/hr
electrical			(till urine clears)

How To Calculate TBSA Burn

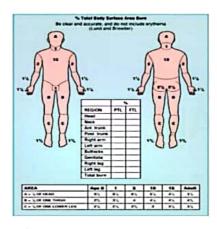
00:23:00

- 1. Palm ---- 1%
- a. Wallace rule of 9
 - · Adults:

children:



3. Lund and Browder charts: Best method.



Degrees Of burns

00:27:00

I degree burns

- Involves epidermis
- Red tender

blanching on pressure

- Heal spontaneously without scarring 3 5 day s
- · Example : Sunburn

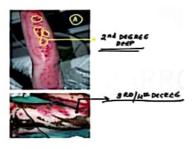
Il degree burns

and degree superficial	and degree deep burns		
 Involves epidermis + papillary Dermis Red, tender, blanching Blister formation Heal without scarring 10 - 14 days 	 Involves epidermis + dermis Red, less tender, some areas won't blanch Hypertrophic scars and keloids 		

and degree burns — proper dressing — to avoid infection

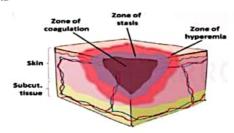
III and Iv degree burns

- · Black, charred
- Painless
- Fixed capillary staining



Management: Early excision followed by spilt thickness skin grafting

Zones of burns



- 1. Zone of coagulation
 - most injured
 - Irreversible damage

94

- a. Zone of stasis
 - Injured but salvageable
 - Can progress to either coagulation or hyperemia
- 3. Zone of hyperemia
 - Vasodilatation
 - Resolves

Burns: management

00:36:33

- Don't burst blisters
- Patients with > 15 20% TBSA burns
- Nutrition in burns
 - Basal energy expenditure (BEE):

Normal — I [ao Kcal/Kg/day] Sepsis — 1.4 Severe sepsis ---- 1.8

Severe burns ---- a

- early initiation of enteric nutrition
- maximum N_a loss day 5 10 atleast 20% calories should come from proteins
- Davies formula to calculate protein requirement: Children 3g/kg+1x TBSA burnt Adults 19/kg + 3 x TBSA burnt
- · Eschar thickened fibrotic tissue
 - Circumferential Compartment syndrome (> 30mmHg)
 - Pain on passive extension
 - Pain not relived with analyesics
 - management escharotomy (or fasciotomy) up till deep fascia is incised.
- Dressing materials:
 - 1st degree : expose the wound

- and degree:

- Superficial burns Vaseline / Paraffin gauze
 Collagen dressing (if non infected)
- Deep burns Collagen dressing
 Hydrocolloid dressing (Duoderm)
- · Other materials / creams used :
 - 1. Silver sulphadiazine (1%)
 - most common
 - good action against pseudomonas, gram -ve bacteria
 - · Doesn't penetrate eschar.
 - a. Silver nitrate
 - good action against pseudomonas, little action against gram -ve bacteria
 - Problems: frequent applications, black staining
 - 3. mafenide acetate 5%
 - · can penetrate eschar.
 - Problems: painful application induce metabolic acidosis
 - 4. Cerium nitrate (best agent)
 - Can penetrate eschar and is immunomodulatory
- management of contracty
 - Z plastyV Y plasty



- · most common cause of death in burns

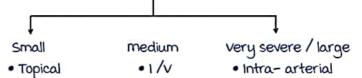
 - Early (1-3 days) Hypovolemic shock
- most common organism ——— Pseudomonas

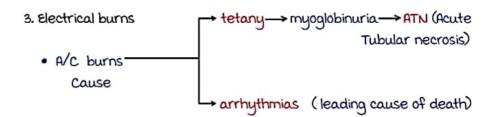
Burns: special situations

00:52:31

1. Circumferential burns: escharotomy

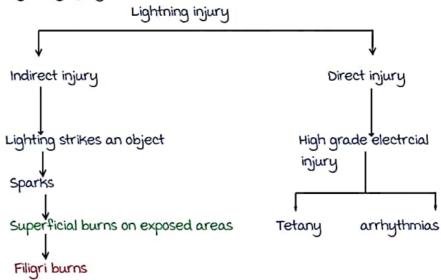
- a. Acid / Alkali burns:
 - Alkali is more severe than acid burns
 - Never try neutralization
 - Wash thoroughly with water.
 - · Hydrofluoric acid burns
 - If involving large areas - Hyperkalemia - Hypocalcemia metabolic acidosis Arrhythmias
 - management: Calcium gluconate (route of drug based on area of burns)





- Usually high grade ($3^{nd}/4^{th}$ degree)
- Entry and exit burns

4. Lightning injury:



Hypothermia

1:02:02

- Core temperature : Rectal temperature

Stage	Clinical symptoms	Core temp	Treatment
Ì	Conscious shivering	3a - a5°c	Passive warming
а	Impaired conscious not shivering	a8 − 3a°c	ECG: J (osborne) waves passive and active rewarming
3	Unconscious, not shivering vital signs present	a4 - a8°c	Stage 2 + ECMO Extra corporeal
4	No vital signs	<a4°c< td=""><td>membrane oxygenation Stage 2 + 3 + CPR upto 3 doses of epinephrine</td></a4°c<>	membrane oxygenation Stage 2 + 3 + CPR upto 3 doses of epinephrine

- Passive rewarming
 - dry the patient
 - warm clothes
 - cover up
- Active rewarming
 - External: heating pad
 - warm bottles
 - Internal: hot IV fluids

gastric lavage with hot fluid

Ecmo

Frostbite and trenchfoot

01:08:07

Frostbite:

- ICE crystals—>formed in tissue: membrane injury
 microvascular damage
 tissue anoxia
- Rewarming may lead to reperfusion injury
- · Stages:

1: hyperaemia and no tissue necrosis

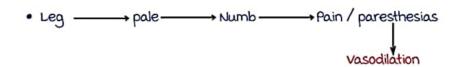
II: large vesicles painful skin loss III: hemorrhagic vesicles full thickness skin loss

Iv: muscle / bone involved.

Trenchfoot:

 Prolonged exposure to cold and tissue is wet microvascular damage

Stasis and occlusion



· Secondary infection: cellulitis gangrene

management

- Gradual rewarming
- Leg dipped in water at 40°c
- · Don't rub the tissue
- Pain —> analgesics
- · Be aware of reperfusion injury: hyperkalemia

Acidosis

 If gangrene --> wait for demarcation --> Amputation line to appear

BREAST - 1

Surgical anatomy of the breast

00:00:23

- modified sweat gland
- Extent
 - → Bulk: and 6th ribs

Sternum, till anterior axillary fold

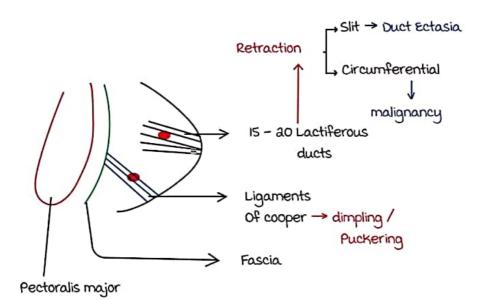
→ Also extends:

superior → clavicle

inferior → 8th rib

lateral → Latissimus Dorsi

Axillary tail of spence



Dimpling

Retraction



 Dimpling and retraction are not signs of skin involvement in Breast cancer

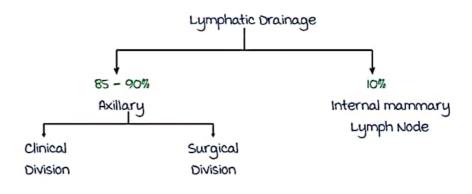
- · Peau d'orange
 - → orange peel appearance
 - → Occurs due to blockade of subdermal lymphatics
 - → If ⊕ in cancer: sign of skin involvement
 - → most conspicuous sign





Lymphatic draining of breast and TDLU

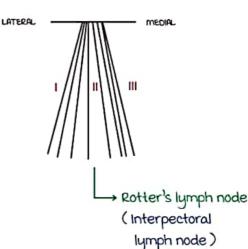
00:06:56



- Anterior
- Based on

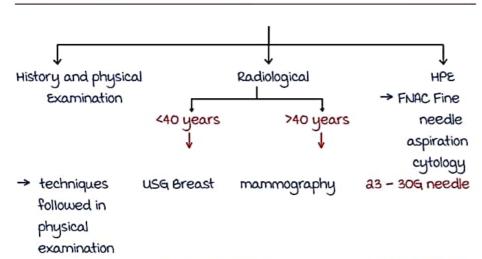
Pectoralis minor muscle

- Central
- Apical
- Lateral
- Posterior groups



TOLU

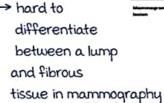
- > Terminal Duct Lobular Unit
- → Functional unit
- → majority of cancers arise from this unit.





→ young patients

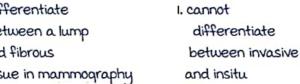
dense breast tissue





→ FNNAC (Fine needle nonaspiriation cytology)

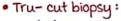
· Drawback:



- a. ER, PR, HER a neu status cannot be done
- 3. High false negative rate
- → 10C :Tru-cut biospy → GOLD: Excisional standard Biospy



STRIPE



- → A/K/A core needle biopsy
- → 8-18 G needle
- → Best for Breast Biospy: 16G needle
- → Incisional Biospy Technique



Radiological tests for breast- mammography

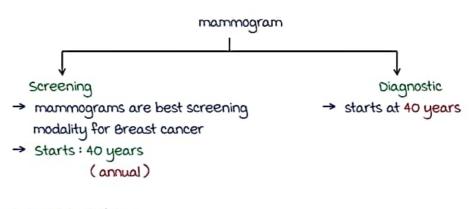
00:21:13

- mammography
- → Contact radiography
- → Radiation exposure: 0.1 0. a cGy
- → CC (CranioCaudal) → a views : [→ mlo (medio Lateral Oblique)

- → mLO:
 - maximum Breast tissue is seen
 - Axilla is visualised
- → Latest technique: 3D Full field Digital mammogram

(Tomosynthesis)

· Advantage: useful in Dense breasts



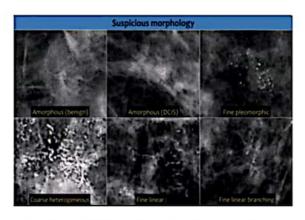
Final Assessment Categories

Catagory	management	Likelihood of	Advice
		cancer	
0 → Need additional imaging or prior examinations	Recall for additional imaging and / or await for examinations	n/a	Get alterna- tive imaging test
1 → Negative	Routine screening	Essentially 0%	Routine screening after 1 year
a → Benign	Routine screening	essentially 0%	Routine screening after 1 year
3 → Probably Benign	Routine screening	> 0 % but < 2 %	Short term 6 months

4→ Suspicious	Tissue Diagnosis	4a. Low suspicion of malignancy (>2% to ≤10%) 4b. moderate suspicion for malignancy (>50% to <95%) 4c. High suspicion for malignancy (>50% to <95%)	Biopsy
5 → Highly suggestive of malignancy	Tissue Diagnosis	≥ 95%	
6→ Known Biospy proven	Surgical excision when clinical appropriate	n/a	



- Lead pipe classification → Fat Necrosis
- Broken Needle → Duct Ectasia
- Tea cup → Fibrocystic Disease



Cluster > Linear > segmental > Diffuse (Highest Risk) (Low Risk)

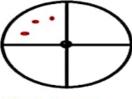
USG and MRI 00:30:21

usa

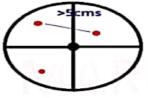
- Advantages:
- 1. Best investigation to differentiate between solid vs cystic lumps
- a. Best radiological test for a pregnant lady with breast lump
- 3. < 40 years
- it is operator dependant.

MRI

1. IOC: to detect multifocal and multicentric breast cancers



Multifocal



Multicentric

a. 10C: In ladies with Breast implant



Linguini Sign

- Intra capsular rupture of implant on USG → step ladder sign
- Extra capsular rupture on USG → Snow storm appearance
- 3. Best imaging test to identify local recurrence after surgery (scar)

t water open

4. most sensitive investigation in DCIS
5. If USG is inconclusive in a suspected ductal lesion → MRI
6. Screening modality in young, high risk patients

→ 1st degree relatives of BRCA mutation patients who don't want to get Genetic Testing Done

→ Li Fraumeni / Cowden syndrome

→ Dense Breasts

→ 15 - 20% risks of Breast cancer
(GAIL INDEX, BRCA Pro score)

Risk factors of Breast cancer

00:39:57

- · Breast cancer Hormone driven cancer
- · Risk factors:
 - 1. 1 age
 - a. Early menarche
 - 3. Late monopause
 - 4. Nulliparity
 - 5. obesity
 - 6. Alcohol
 - 7. Family History (maternal and paternal are equally important)
 - 8. Hormone Replacement Therapy (HRT)
 - Estrogen + Progesterone : 1 1 risk
 - Low dose OCPs: Doesn't increase risk for breast cancer
 - 9. Radiation Exposure
 - 10. maternal Age at first live birth



Breast feeding → At least 1 year is protective

Risk

conditions.

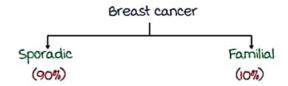
- → No increased risk
- -> Adenosis, sclerosing or florid
- → Apocrine metaplasia
- → Cysts, macro and/or micro
- → Duct Ectasia
- → Fibroadenoma
- → Fibrosis
- → Hyperplasia
- → mastitis (inflammation)
- → Periductal mastitis
- → Squamous metaplasia

Active space

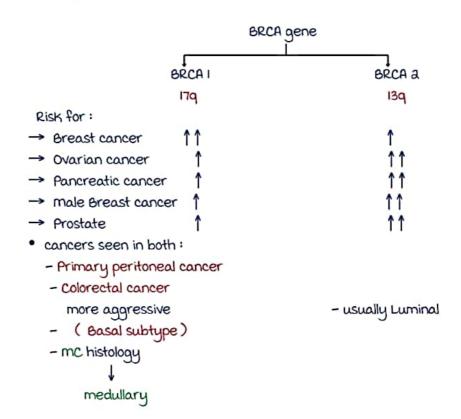
- → Slightly increased risk (1.5 - a times)
- → Hyperplasia, moderate florid solid or papillary.
- → Papilloma with a fibrovascular core
- → moderately increased risk (5 times)
- → Atypical Hyperplasia (ductal or lobular)
- → Insufficient data to assign a risk.
- → Solitary papilloma of lactiferous sinus
- → Radial scar lesion

Pathology of breast cancer

00:45:20



- mc gene mutated in Breast cancers → p53
- mc gene mutated in Familial Breast cancers → BRCA I





can predispose patients to Hereditary Breast and Ovarian Cancer syndrome.

(HBOC syndrome)

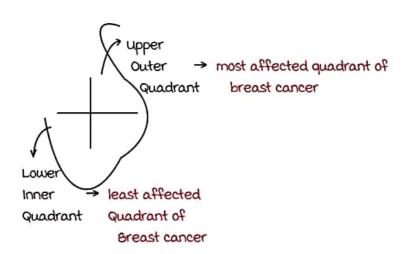
1st degree relatives are screened



Lifestyle changes:

- weight reduction
- Regular excercise
- Stop smoking / alcohol
- · mRI screening: 25 years
- Risk Reduction

Risk Reduction Techniques Tamoxifen Bilateral Bilateral Prophylactic Salpingo-Oophorectomy (SERM) mastectomy (BSO) → breast cancer by 47% ↓ Breast: ↓↓95% → ovarian: 90% cancer cancer > Ovarian: 10% (10% Risk of fallopian stump cancer) cancer → | Breast: 50% cancer After completion of family but before 40 years.



00:56:10

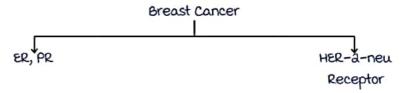
Infiltrating Ductal carcinoma (IDC)

- m C Histological type: Infiltrating Ductal Carcinoma NOS
 NOS → Not otherwise Specified.
- Histological IDC:
 → Tubular (decreasing order of prognosis)
 → mucinous
 → medullary

Invasive Lobular cancer (ILC)

- Single file Pattern
- mutation in E-cadherin.

Receptors



Non amplified

→ 0-8

→ Alred score

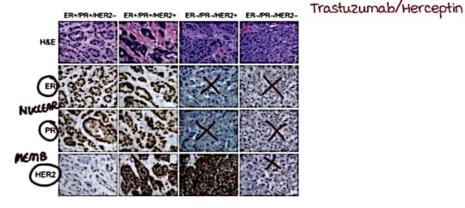
1+

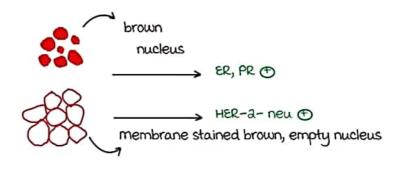
Negative ←

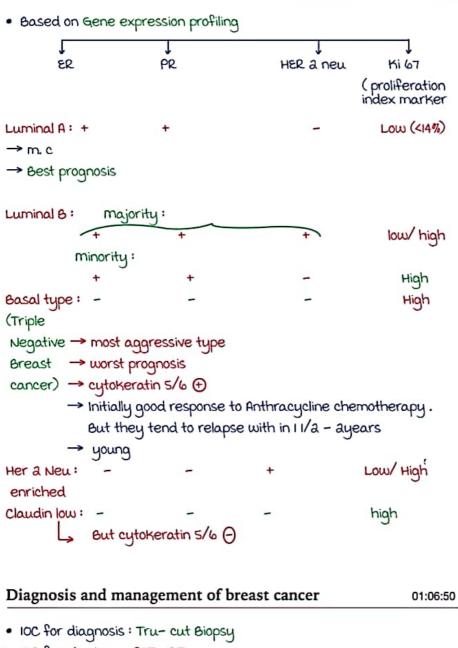
2+ → Equivocal → FISH

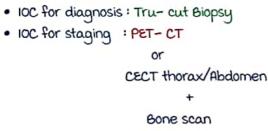
3+ → Positive

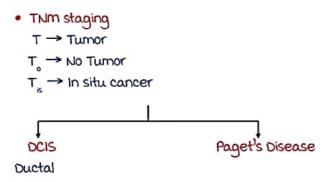
amplified











show peau d'orange

```
→ LCIS (Lobular) is no longer considered in situ
   → Benign Disease
 → ≤acm
   T, mic → < 0.1 cm
       → 0.1 - 0.5 cm
   T, b → >0.5 - 1 cm
         → 1- a cm
         → >a cm but ≤ 5 cm
         → >5 cm
                                                  → Inflammatony
→ Involvement → involvement
                                     -> A + B
  of chest
                                                    breast cancer
                  of skin
   wall
                → Peau d'orange
-> Ribs
                                                         worst
                  ulceration
  Serratus
                                                        prognosis
                  satellite
  anterior
  Intercostal
                   nodules
                                                 →>1/3rd of breast
  muscles
```

→ Pectoralis major, → dimpling,
minor are retraction
not adherent to
considered skin are not
as involvement considered
of chest wall as involvement
of skin.

N
N
→ No Lymph Node
N
→ mobile Axillary lymph node
N
→ A: Fixed / matted
→ 6: Internal mammary lymph node ←
Axillary ←

N3 A: Infraclavicular lymph Node

B: Internal mammary and axillary (+)

C: Supraclavicular Lymph node

Ipsilateral Lymph Node:

→ If contralateral Lymph Nodes (+) → metastatic Disease

m → Distant metastasis

- m. c site : Bones (vertebral column)
- Due to Batson Plexus
- Lumbar vertebrae (mc)
- Type : osteolytic > osteoblastic
- Prefixes used in TNM staging:

cTNM → clinical

pTNm → pathological

rTNM → recurrent

mTNM -> multiple

yTNM → After neoadjuvant

aTNM → Autopsy

- · Isolated Tumor cells
 - → cluster ≤ 0.2 mm and < 200 cells.
- micrometastasis
 - → deposit >0.2 mm and ≤ 2.0 mm

or

≤ 0.2 mm and >200 cells

- macrometastasis
 - → deposit > a.o mm
- Sentinel Lymph Node biospy in Breast cancer:
 - → If sentinel lymph node shows: Isolated Tumor cells or micrometastasis

1

its not considered positive

Active space

BREAST - 2

Management of breast cancer: Surgery 00:00:16 mastectomy conservation surgery (BCS) · Overall Survival: Same Same Loco regional: recurrence (LRR) Radiotherapy is mandatory Breast conservation surgery (BCS) Lumpectomy Earlier margin → 1 cm margin Now ------ I mm margin · Contraindications of BCS Contraindication Technical for radiotherapy 1. multicentric (absolute) a. multifocal (relative) 3. Lobular cancer (tends to be 1. Pregnancy (absolute) multicentric) Locally advanced breast cancer a. Collagen vascular 5. Large tumor / breast ratio disease (SLE/RA) 3. Prior radiotherapy Relative to chest wall mastectomy mastectomy modified Radical mastectomy Simple → by Halstead Radical → Structures removed : mastectomy (mRm) → Strucrutes removed: · Breast +NAC Breast → Incision : Elliptical · Pectoralis fascia

stewart

· NAC (Nipple-areola

complex)

Boundaries of Axillary dissection

- Thoraco dorsal pedicle supplies latissimus dorsi lateral
- Axillary vein-superior
- Angular vein-inferior
- Halstead ligament-medial
- · Long thoracic nerve is not a boundary.
- Structures saved in mRm :
- → Boundaries of axillary dissection
 - Pectoralis major
 - Lateral and medial pectoral nerve preserved.

Complications following MRM

00:12:49

- 1. Hemorrhage
- a. Injury to nerves
 - → m. C injured nerve: Inter costo brachial nerve (ICBN)

L Sensory nerve to axilla ..

- → Long thoracic nerve → winging of scapula (Nerve of Bell)
- → Thoracodorsal nerve → Latissimus dorsi
- → Lateral and medial → Pectoralis major and minor pectoral nerve
- 3. Flap necrosis
- 4. m.C complication : Seroma formation

L Accumulation of fluid beneath the flap

- → Drains are removed when output <40 cc/day for a consecutive days
- → Seroma

Aspiration under aseptic conditions and do pressure dressing

5. Lymphedema

- → Post mastectomy lymphedema → m. C cause of upper limb lymphedema
- → a-10%
- → Factors 1 risk:
 - Lymph node removal
 - · Radiation to axilla
 - · Infections in upper limb
- → Long standing lymphedema → Angiosarcoma/ Lymphangiosarcoma

Stewart Treves syndrome

→ lag of 10-12 years

→ Bluish/reddish nodules

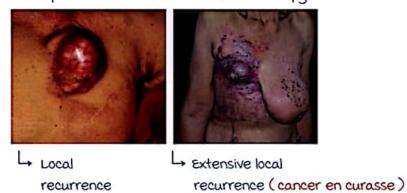
→ management: Forequarter

amputation

→ Poor prognosis

Chemotheraphy

- 6. Local recurrence / scar recurrence
 - → mRI is loc
 - → But false positive within 6 months of Radiotherapy



- 7. Phantom breast syndrome
 - m. C cause: Inter costo-brachial nerve neuralgia; (ICBN)

Sentinel lymph node biopsy (SLNB)

00:27:42

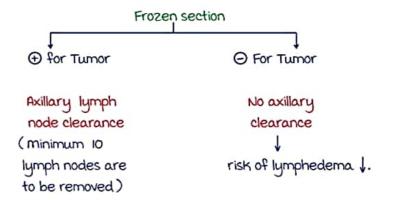
- · 1st draining lymph node from cancer
- 1st cancer for which SLNB performed: Penile
- Surgeon : Cabana
- Other cancers
 - → Breast
 - → malignant melanoma
 - → Vulval
 - → Head and neck

In Breast cancer:

- Indication: no clinical lymph node enlargement in axilla.
- · Identification:
 - Blue dye : Methylene blue
 Isosulfan
 Patent blue
 - → 1-1.5 cc of dye is Injected in periareolar region (subcutaneous plane)
 - → Lymph nodes which are blue in colour → Sentinel lymph nodes

sent for

Frozen Section



- → Complications of blue dye technique
 - 1. m.c : skin tattooing
 - a. Necrosis
 - 3. Anaphylaxis
 - 4. Bluish urine
- a. Radionucleotide method
 - → Tc 3 tagged sulphur colloid
 - → Using Gamma camera, the hot or most radioactive lymph node is found.
- 3. Combined method.
 - → Best technique
 - → Hot and Blue lymph node
- 4. Sentimag technique
 - → Ferric oxide compound is injected
 - magnetic scanner is used to detect sentinel Lymph node.
 - → No radiation exposure
- m.c nerve injured: ICBN (intercostal brachial nerve)
- · majority of sentinel lymph nodes: Level 1 of axilla
- majority of patients: usually more than I sentinel lymph node.

- m. C used flap: TRAm (Transverse rectus abdominus myocutaneous)
 flap
- Best flap: DIEP (Deep inferior epigastric artery perforator)



DIEP Flap



Skin sparing mastectomy

(DIEP reconstruction)

Chemotherapy

00:42:46

- · Indications :
 - I. Positive lymph node
 - a. Triple negative breast cancer (TNBC)
 - 3. HER a NEU (+) tumor

[Chemotherapy + Herceptin (Trastuzumab)] → 1 year

- 4. > 1 cm in size.
- 5. Locally advanced breast cancer.
 - Traditional chemotherapy: CAF
 CMF

→ C A F

cyclophosphamide Adrialmycin 5- Fluoro uracil

→ C m F Cyclophosphamide methotrexate 5- Fluorouracil

Side effect: Hemorrhagic cystitis

metabolite causing haemorrhagic cystitis:

Acrolein

Preventive agent

used: mesna

- · Latest chemotherapy:
 - 4 AC/EC followed by 4 T

→ 4 cycles of:

Adriamycin + Cyclophosphamide Taxanes

or

Epirubicin + Cyclophosphamide (Paclitaxel / Docetaxel)

can cause Neuropathy

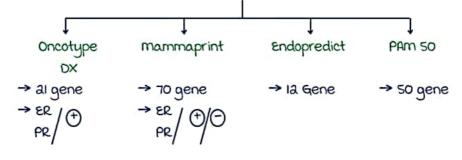


- Helps to give chemotherapy and to draw blood.
- Situations where chemotherapy is avoided in breast cancer:
- 1. Poor performance status:
 - → Scores to assess performance status:

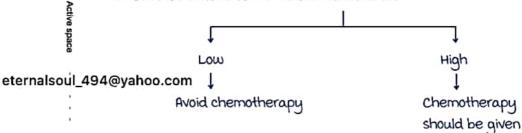
Karnofsky score

Eastern cooperative oncology score

- a. >70 years of age
- 3. T, No mo and ER, PR (+) but HERANEU (-)
 ER, PR (-)
 - → Candidates for molecular tests



· Based on these tests: Recurrence Score



- · Indications:
 - 1. Post breast conservation Surgery
 - a. Positive Lymph node
 - 3. Locally advanced breast cancer
 - 4. >5 Cm

Types:

Conventional

WBI

(Whole breast

irradiation)

- → as days
- → Single sitting / day
- > 50 54 Gy
- → Given to:
- Chest wall
- Supraclavicular and infraclavicular fossa
- Internal mammary lymph nodes

APBI

(Accelerated partial breast radiation)

- → 5 days
- → a sittings / day
- → 30 35 Gy
- → Given to:
 - Tumor cavity
 - Adjacent tissue



- · Indications for APBI:
 - 1. Patient 50 years or more
 - a. Negative margins
 - 3. ER, PR (+)
 - 4. T tumor
 - 5. No lymphovascular invasion (LVI)
 - 6. Unifocal tumor

Only if every criteria is met

Hormonal therapy

00:58:06



→ SERM (Tamoxifen) → Aromatase inhibitors

(Letrozole, Anastrozole, Exemastane)

Earlier: 5 years

5 years

Atlas trial: 10 years

10 years

→ Side effects of

→ Side effect

Tamoxifen:

(1) m. c : Hot flashes

(i) m. c : Osteoporosis

(a) Endometrial hyperplasia

(3) DVT

Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with marrow Edition 4 videos.

Early breast cancer

01:01:45

$$T_a / N_o / m_o$$
 $T_a / N_o / m_o$

T. No mo -> Large operable Breast cancer

$$\begin{array}{c|c} \bullet & T_{i} & N_{o} \\ T_{a} & \text{or} \\ \downarrow & N_{i} \end{array} / \begin{array}{c} m_{o} \\ N_{i} \end{array}$$

Surgery:

Breast conservation surgery (BCS)

a. if clinically No Axilla

SLNB

3. If Bcs is contraindicated;

mastectomy

Chemotherapy:

1. T,
$$N_0$$
 \bigcap_{er} Er , $PR \oplus$ • Radiotherapy if \oplus Lymph nodes Er , $PR \ominus$ • After BCS

molecular Tests

a. . IF TNBC

- · If HER & NEU 1
- IF Lymph node ⊕

Chemotherapy + Herceptin

Hormonal therapy:

- ER, PR (+)
- T, No mo (Large operable breast cancer)
- → Neoadjuvant chemotherapy

Shrink tumor

Surgery

Locally advanced and metastatic breast cancer

01:05:36

Locally advanced Breast cancer

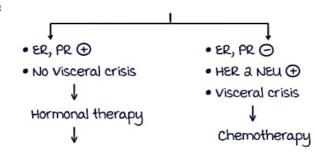
$$\rightarrow$$
 T₃ N₁ mo
 \rightarrow Any T₄ / m₆
 \rightarrow Any N₃ -

Neoadjuvant chemotherapy → mRm → Radiotherapy

- → If Her a NEU ① : Herceptin
- → If ER, PR ① : Hormonal therapy
- most important prognostic factor for bresat cancer: Axillary lymph node status
- most important prognostic factor for metastatic Breast cancer:
 ER, PR Status

metastatic breast cancer

Palliative



Active space

17

Till tumor responds, continue hormonal therapy

Hormone Resistant



Chemotherapy

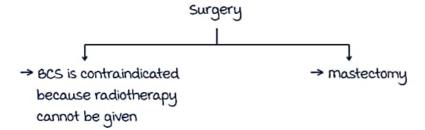
- → Trastuzumab pertuzumab
 - · HER a NEU (+) metastatic cancer
- -> Palbociclib
 - COK 4/6 inhibitor
 - · ER, PR (+) and HER A NEU (-) metastatic cancer
- → Atezolizumab
 - metastatic TNBC
 - PDL I Inhibitor
- → Alpelisib
 - PI 3 K inhibitor
 - ER, PR (+) metastatic cancer
- → Olaparib
 - PARP inhibitor
 - · BRCA Positive
- → Fulvestrant
 - Selective estrogen down regulator

Breast cancer: Special Situations

01:14:56

- 1. Male Breast Cancer
 - 0.5 1%
 - · Risk Factors :
 - → BRCA a > 1 mutation
 - → Klineflter syndrome
 - → Cirrhosis
 - Diagnosis, management and prognosis: Same as female cancer
- a. Bilateral breast cancer
 - BRCA positive patients
 - Both tumors are staged separately
 - Higher stage tumor governs treatment .

- 3. Pregnancy associated breast cancer
 - · Breast cancer during pregnancy or within one year of delivery
 - · Presents with lump .
 - · Imaging : USG
 - Diagnosis: Tru-cut biopsy
 - · Usually ER, PR (
 - Aggressive tumors
 - management: Surgery



→ If patient comes in and / 3rd trimester

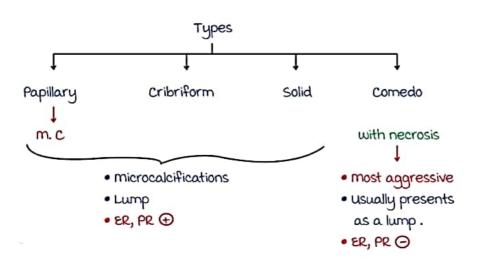
BCS can be done

and radiotherapy is given after delivery.

- · Chemotherapy
- → Contraindicated in 1st trimester
- Radiotherapy and hormone therapy
- -> Contraindicated in all trimesters

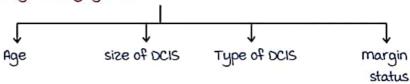
Ductal carcinoma in situ (DCIS)

01:21:29



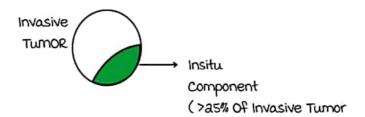
Diagnosis: Stereotactic tru-cut biopsy

Van Nuys scoring system (For DCIS)



→ ER, PR is not included

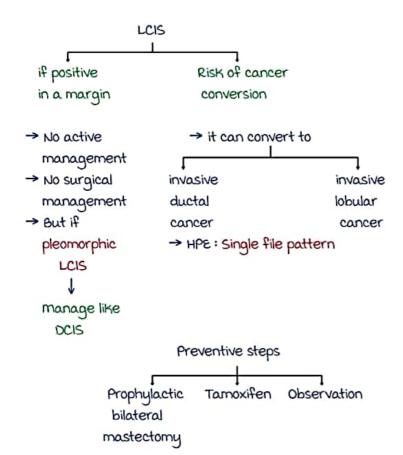
extensive intraductal component (EIC)



Lobular carcinoma insitu

01:28:29

- Benign condition with risk of cancer (1% per year)
- · Tends to be bilateral and multicentric
- · ER, PR (+)
- Pleomorphic LCIS
 - > ER, PR (-)
 - → Behaves like high grade DCIS
- · Clinical features:
 - → Incidental diagnosis
 - → Lump
 - → microcalcifications



BREAST - 3

Breast abscess

00:00:11

Breast Abscess

Lactational breast abscess

- most common organism -Staphylococcus aureus
- Staphylococcus aureus

 a. Source of Infection -

oropharynx of the child

- 3. Clinical features
 - Pain
 - Fever
 - Swelling
 - Fluctuation (late sign)

Breast abscess associated with duct ectasia

- 1. Occurs in peri-menopausal women
- a. Cause aerobic + anaerobic microbes
- 3. Diagnosis USG
- 4. Management
 - (i) Antibiotics
 - (ii) Surgery Hadfield's Procedure

∜

Late sign seen in \rightarrow i) Breast

- (ii) Parotid
- (iii) Palmar
- (iv) Plantar
- (v) Ischiorectal abscess
- 4. Diagnosis

ultrasound (USG)

- 5. Management
 - (i) Antibiotics Amoxycillin + Clavulanic Acid

(or)

Cloxacillin

- (II) Analgesics
- (iii) Incase of Pus

USG guided aspiration [atleast - a attempts]
Failure

19 D [Incision & Drainage] with Blade number - 11

Confirmatory diagnosis - Biopsy from the wall of the lesion

Aberrations of normal development & involution [ANDI]

00:06:07

ANDI covers all benign breast conditions

Age related conditions:

15 - 25 years - Fibroadenoma (most common)

Fibrocystic disease

Cyst in breast

25 - 40 years - Fibrocystic disease (most common)

Fibroadenoma

cysts

Phyllodes tumor

> 40 years - Fibrocystic disease (most common)

Duct ectasia

Fibroadenoma

00:08:12



mammogram - Pop corn Calcification

· most common cause of breast lump

```
· Age group - 15 - 25 yrs
Clinical features
      - Firm, mobile lump
      - Painless
                    multiple fibroadenoma
      - 10% cases
 Diagnosis
      - usq
                           " Pop corn " calcification .
      - mammogram
 Types
   Based on histopathological examination (HPE)
                Fibroadenoma
    Pericanalicular
                                  Intracanalicular
         ∜
   Hard type
 management
  (i) Indications for surgery
      - Cosmetic
      - Painful
      - Rapid T in size
      - Family history of breast cancer
      - Giant fibroadenoma (> 5cm)
  (ii) Type of incision
      a. Peri-areolar incision
           Closure of incision - Subcuticular sutures
```

b. Gillard Thomas incision

Infra mammary incision

Active space

[Radio frequency ablation]

[Vaccum assisted biopsy system]

mammotome -> 8G needle

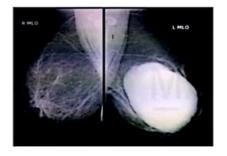
Limitations

a. Fibroadenoma ≥acm size

b. Fibroadenoma away from midline

Phyllodes tumor

00:15:19



- · Also known as cystosarcoma phyllodes
- Occurs in 3rd/4th decade of life
- Benign or malignant
 - Number of mitotic figure on a biopsy (Trucut/excisional biopsy)



Differentiate Benign / Malignant

- FNAC has no role

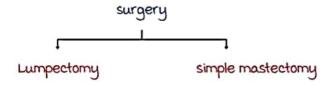
1. Clinical features

- · Rapidly enlarging breast lump
- Dilated veins

a. Diagnosis

Biopsy

- malignant Phyllodes
 - Hematogenous spread
 - most common site : lungs
 - <10% spread to lymph nodes (LN)



[wide Local excision]

Indications for simple mastectomy

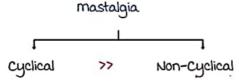
Recurrence

[Phyllodes - Recurrence is very common]

- Very large tumor
- malignant

Mastalgia

00:19:34



1. Seen in Fibroadenosis /

Fibrocystic disease

- a. occurs in a5-40 yrs
- 3. clinical features
- · Pain [Beginning of cycle]
- 4. on examination
- Lumpy Breast
- 5. Diagnosis

usa

- 6. management
 - Life style changes
 - Weight reduction
 - · I tea/ coffee

Treatment - Intralesional triamcinolone a. Mondor's disease

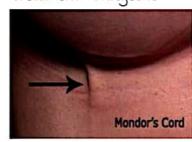
(costochondritis)

1. Causes - Tietze syndrome

- Superficial thrombophlebitis of chest veins
 - Cord-like structure
 - Presentation Pain
 - most common vein Involved

Lateral Thoracic Vein

Treatment - Analgesics



18

Vitamin € § Primrose oil Capsules

x a months Pain persists

- · Low dose Tamoxifen (preferred)
- Danazol

Breast cysts

00:24:43

1. Diagnosis

usq

- a. Aspiration indications
 - Symptomatic individuals
 - Large cyst
 - Complex cyst (solid features +)



- Non Bloody
- · Bloody
- Cyst resolves
- Residual cyst ⊕

completely

management - excision of cyst

management - monitoring

Fluid cytology not required
 Fluid cytology [To rule out cancer]

Nipple discharge

00:26:52

	single duct	multiple duct	surface of nipple
serous	PregnancyPubertyCancerDuctectasia	PregnancyPubertyCancerDuct ectasia	Paget's Eczema
Greenish / Bluish		 multiple duct ectasia most common cause of patho- logical nipple discharge 	
milkish		• Lactation • ↑ Prolactin	

	single duct	multiple duct	surface of nipple
Bloody	• Duct papilloma	• Cancer • Duct ectasia	

1. Duct Papilloma

- most common cause of bloody nipple discharge
- 10% cases → multiple
- 10% cases → associated with DCIS (Ductal carcinoma in situ)

Clinical features

Bloody nipple discharge from a single duct

Diagnosis

i) USG -> Ectatic duct [mass inside a dilated duct]

ii) Cytology of nipple discharge - low sensitivity

iii) Ductoscopy

management

microdochectomy

- Tennis racquet incision
- single duct flump → excised

a. Duct Ectasia

Age - >40yrs (perimenopausal women)

Clinical presentation

Dilated ducts

1

Stasis of secretion

,

Periductal mastitis

[Zuska's disease]

Periareolar abscess/

Bluish / Greenish

Sinus formation

discharge [multiple ducts]

Diagnosis

usa -- multiple dilated ducts

· Rule out cancer

Active space

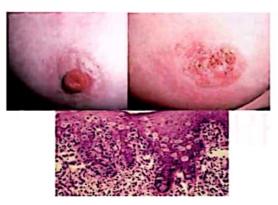
management

- Antibiotics
- If the condition persists ⇒ Hadfield procedure [cone excision of multiple ducts]

Paget's disease & Eczema

00:35:38

Paget's -> Superficial manifestation of an underlying malignant condition



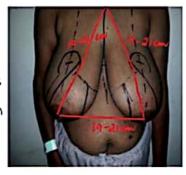
Paget's disease	Eczema
• unilateral	• Bilateral
• Eczema – like condition	NAC - not destroyed
 Nipple areolar complex (NAC) - 	
destroyed	management
Diagnosis	 Topical steroids
 Punch biopsy → Paget cells in 	
epidermis	
. ↓	
er q pr⊖, Hera	
Neu⊕, CEA⊕	
• 70% cases have an underlying	
lump	
Lump	
usually DCIS IDC (Invasive	
ductal carcinoma)	
management	
management of the underly-	
ing lump	



Abnormalities Of breast tissue	Abnormalities Of nipple	
1. Polymastia	1. Polythelia	
 Accessory breast tissue 	 Accessory nipples 	
 most common site-Axilla 	a Athelia	
Clinical features	 Absence of nipples 	
 Cosmetic blemish 		
management		
• Excision		
Indications for excision		
 cosmesis 		
• Pain		
• Lump		
a. Amastia		
 Absence of breast tissue 		
 Known as Poland syndrome 		
 Absence of unilateral pectoralis 		
major q breast tissue		

Breast reduction surgery

- Breast hypertrophy
 - Patient presents with large breast+ neck pain, backache, fungal infections
- Inverted "T" pattern of breast reduction
- Distance between a nipples in breast reduction = 19-a1 cms.



Leave Feedback

. Enlargement of male breast tissue

Causes of gynecomastia

Physiological

Pathological

i) Puberty

i) Idiopathic

ii) Newborn

ii) Drug Induced

iii) Senile

D - Digoxin

1 - INH (isoniazid)

S - Spironolactone, Steroids

C - Cimetidine, K - Ketoconazole

0 - Oestrogen

iii) Lepromatous / mumps orchitis

iv) Cirrhosis

v) Klinefelter syndrome

vi) Tumors - Renal cell cancer

Hepatocellular cancer

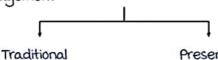
Testicular cancer associated

with para-neoplastic syndrome

Diagnosis

USG - Atleast 3cm diameter disc of breast tissue

management



Present

Sub-cutaneous

Liposuction

1

mastectomy

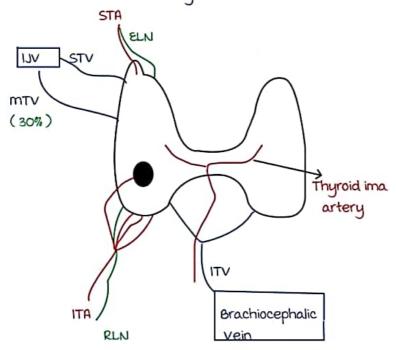
Gland excision

THYROID - 1

Thyroid - surgical anatomy

00:00:26

- Thyroid butterfly shaped gland
- · Has a lobes which is connected by isthmus



- Blood supply Thyroid
- i) Arterial supply
 - a. Superior Thyroid Artery [STA]
 - Branch of external carotid artery
 - b. Inferior Thyroid Artery [ITA]
 - Branch of Thyrocervical trunk (Which is a branch of subclavian)
 - Supplies parathyroid gland
 - c. Thyroid ima artery
 - Direct branch from arch of aorta
- ii) venous drainage
 - a. Superior Thyroid Vein [STV]
 - Drains into Internal Jugular Vein [IJV]
 - b. middle Thyroid Vein [MTV]
 - Drains directly into UV
 - Seen in 30% cases
 - Surgical importance
 - First vessel to be ligated during thyroidectomy
 - c. Inferior Thyroid Vein [ITV]
 - Drains into brachiocephalic vein

- 19
- Nerve Supply Thyroid
- a. External laryngeal nerve [ELN]
 - Supplies only to Cricothyroid [tensor of vocal cords]
 - Cricothyroid: used to speak at high pitch.
 - Associated with superior pole.
 - Nerve : is away from artery(close to the gland) is close to the artery(away from the gland)
- b. Recurrent Laryngeal Nerve [RLN]
 - assosiated with Inferior pole
 - Beahrs Triangle
 - Common carotid artery
 - ITA
 - RLN

Helps to identify RLN during surgery

- Right RLN 2% cases have non-recurrent laryngeal nerve
- Course of RLN
 - i) Left RLN: Longer course
 - : Winds around arch of aorta
 - ii) Right RLN: Comparatively short course
 - : Winds around subclavian artery
- Sensory supply below the cords
- Supplies all muscles, except cricothyroid
- Common site of injury : Berry's ligament

[condensation of pretracheal fascia]

: organ of zuckerkandl

[Posterolateral aspect of the gland]

- Ligation of arteries
 - i) STA ligated close to the gland
 - Importance: To prevent injury to ELN
 - ii) ITA ligation of capsular branches close to the gland
 - Importance: To prevent devascularization of Parathyroid gland (Hypoparathyroidism)

Note:

 Bipolar cautery is preferred [prevent thermal damage to nerves]

```
i) Inspection of thyroid gland

a. Normal thyroid gland — not visible

b. Instruct the patient to swallow and check for

i) Gland mobility

ii) Lower limit of the swelling

— If mobility — absent (on inspection)

Palpation of Thyroid gland

Lower limit — not felt ⇒ Retrosternal goitre

ii) Palpation of thyroid gland

a. Examiner stands behind the patient
```

- Examination of nodualrity & lower limit
- b. Pizzillo's method
 - Patient's hands behind the head, and is asked to push aganist clasped hands on the occiput
 - Enlargement of gland
 - · Uniform enlargement physiological goitre
 - Colloid goitre
 - Hashimoto's disease
- Nodularity of the gland
 - · Isolated nodules of different size

1

Nodular goitre

- Swelling lateral to thyroid

М

Aberrant gland / lymph node from cancer

c. Lahey's method

Examiner stands in front of the patient

A

pushes the gland to one side

Ω

palpates margins / lateral borders [Best method]

- Examination of one side at a time
 - [Pressure on both sides at a time -> syncopal attack]

d Crile's method

- Examiner stands in front of the patient
- Patient instructed to swallow while examining
- Thumb of the examiner is used

Ш

To check for nodularity

iii) Eye signs:

The Patient & examiner should be at same eye level

Von Graefe's sign

Examiner supports the patient's head

Patient is instructed to follow the moving object

Failure of the upper eye lid to follow a downward movement of the eyeball

Stellwag's sign

Infrequent blinking

- Joffroy's sign
 - Lack of wrinkling of the forehead when the patient looks up with the head kept straight
 - Bulged eyeballs
- mobius sign

Patient is instructed to focus on a distant object

Examiner - introduce an object suddenly in the line of sight

Patient is now instructed to shift his focus on the object in examiner's hand.

Examine for convergence

- Inference: Inability to maintain convergence

Investigation in thyroid disorders

00:15:04

1. Investigation - Thyroid Function Test [TFT]

- T₃, T₄, TSH (Thyroid Stimulating Hormone)
- · Free T, /T,
- · Anti thyroid antibody

Inference: ↑ ↑ TSH -> Hypothyroidism ↓ TSH → Hyperthyroidism

a. Ultrasound (USG) neck

- Check for . Gland enlargement
 - Nodularity
 - Vascularity
 - Lymph nodes
- Exception: Hyperthyroidism features + low TSH

Thyroid scan

3. FNAC

- Fine needle aspiration cytology
- IOC (Investigation of choice) for thyroid disorders.
- USG guided FNAC → ↑ yield of FNAC

Note:

Cannot differentiate between follicular adenoma Vs Carcinoma Bethesda classification of FNAC [Not a true Bethesda classification]

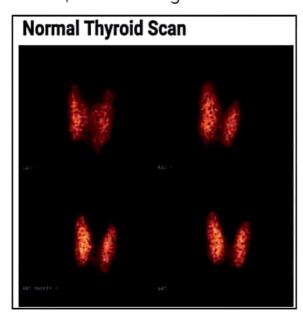
Thy 1 Thy 1c	Non diagnostic Non – diagnostic cystic	Repeat USG-guided FNAC
Thy a	Non - neoplastic (Benign)	Follow up [if no indicator for resection present]
Thy3	Follicular	Hemithyroidectomy
Thy4 Thy5	Suspicious of malignancy malignant	Surgery

4. Thyroid scan



- · Technitium 99 scan
- Conveys only about uptake of the gland
- lodine 123 scan
- Conveys: uptake + organification of the gland

- Indications
 - Low TSH + Hyperthyroidism
 - Ectopic / Aberrant thyroid tissue



00:27:24

- i) cold nodule
 - Nonfunctioning nodule
 - 20% chance of malignancy
- ii) Hot nodule
 - Hyperfunctioning nodule
 - 4% chance of malignancy
 - Solitary toxic nodule
- iii) Grave's disease
 - Diffuse, 1 in uptake
- iv) Toxic nodular goitre
 - also known as Plummer's disease
- v) Thyroiditis
 - Diffuse ↓ ↓ uptake
- 5. Whole body iodine Scan
 - To check for residual / metastasis / recurrence
 - Postsurgery in DTC (Differential thyroid cancer)
- 6. CECT Thorax & Neck
 - Contrast Enhanced CT [CE CT]

Indications

- Retrosternal goitre
- · Large malignant goitre

Embryology of thyroid gland & associated conditions



- Remnant of thyroid tract
- 1. Developement of thyroid gland
 - Thyroid gland develops from thyroglossal tract
 - Thyroglossal tract arises from foramen caecum

[Tongue - Junction of anterior a/3 rd & Posterior 1/3 rd]

Tract descends into the neck

At tracheal cartilage - Tract splits into a

Tract - obliterates & Thyroid gland is left behind

- a. Thyroglossal cyst
- If the Thyroglossal tract persists

Thyroglossal cyst

- · Hyoid Bone Forms around the tract
- most common site for thyroglossal cyst → Subhyoid Clinical features of thyroglossal cyst
 - i) mid line neck swelling
- ii) Swelling moves with deglutition & protrusion of tonque Diagnosis of thyroglossal cyst
 - i) FNAC
 - ii) USG neck To identify the presence of normal thyroid gland

management of thyroglossal cyst

ii) Sistrunk surgery

Removal of cyst + Tract (till base of tongue) + a part of hyoid bone

Note

Long standing case of thyroglossal cyst

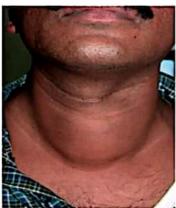
PTC [Papillary thyroid cancer]

- 3. Thyroglossal fistula
 - Always an acquired condition
 - · Either due to 19 D of thyroglossal cyst

due to rupture of thyroglossal cyst

- management: Sistrunk surgery
- 4. Lingual thyroid
 - Thyroid gland below the tonque
 - USG Neck To identify the presence of normal thyroid gland

Goitre 00:34:31







multinodular goitre

- i) Diffuse goitre [physiological goitre]
 - Cause: Iodine deficiency
 - Occurs in pregnancy / puberty [1 demand]
 - Variable stimulation of gland by TSH

Thyroid gland

Hyper - functioning / Non - functioning / Normal

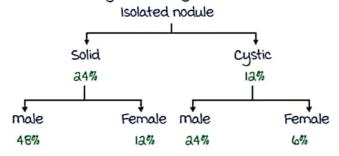
- ii) multinodular goitre
 - Cause: Variable stimulation of thyroid gland by TSH

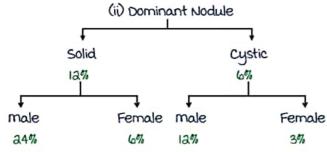
multiple nodules

- Diffuse goitre ⇒ multinodular goitre
- Active area: internodular area

Note:

- (i) multinodular goitre multiple nodules
- (ii) Isolated nodule
 - Single nodule Palpable
 - · Rest of the gland Not palpable
- (iii) Dominant thyroid nodule
 - Single (dominant) nodule Palpable
 - Rest of the gland Palpable





(iii) Retrosternal goitre



Cause - Ectopic thyroid

tissue in mediastinum

Prevalance - 10%

Blood supply - mediastinal vessels

Clinical features: i) Dyspnoea

ii) Stridor

iii) Swelling

on Examination: i) Lower limit of the swelling - not palpable

ii) Pemberton's sign - Bilateral arm elevation

Facial congestion

into mediastinum

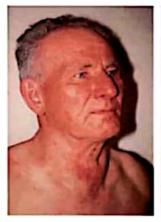
Prevalance - 90%

Starts in the neck, But plunges

blood Supply - Thyroid vessels

Incase of dark skin individuals

- Check for conjunctival congestion





Active space

```
Investigations:
  IOC - CECT neck & thorax
Treatment:
  i) Surgery
        - most common surgical approach - Neck incision
                                              (cervical incision)
  ii) Indications for sternotomy
       a). Malignant retrosternal goitre
       b). 1° mediastinal goitre
       c). Very large retrosternal goitre
       d). Recurrence in mediastinum
```

Thyroid surgery

00:45:01

```
 i) Indications for thyroid surgery

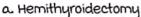
  a. Neoplasia
      - FNAC positive Thy 3 - 5
      - Clinical Suspicion: Old age
                         male sex
                          Hard texture
                          Fixity
                          Recurrent laryngeal nerve palsy
                          Lymphadenopathy
                          Recurrent cyst
  b. Toxic adenoma
  c. Pressure symptoms
```

- d cosmetics
- (ii) Position for thyroid surgery
 - Rose position
 - Supine
 - Towel roll below shoulder blades
 - Neck extension
 - 30° head up
 - i) venous congestion



Blood less field

- ii) But, 1 risk of air embolism
- (iii) Incision for thyroid surgery
 - Collar incision
 - a fingers breath above suprasternal notch
 - Extending from one sternocleidomastoid to another sternocleidomastoid





- Lobectomy + Isthmusectomy

b. Subtotal thyroidectomy



- ax subtotal lobectomy

Isthmusectomy

- 8gm of tissue is left behind

c. Total thyroidectomy

- ax Lobectomy + Isthmusectomy



d Near total thyroidectomy

- also Known as Hartley Dunhill procedure
- Lobectomy + Subtotal lobectomy +
 Isthmusectomy
- A part of tissue is left behind in one lobe

(v) Injury Rate

- Injury rate of RLN injury
 - RLN injury Equivalent for
 - Hypothyroidism

Hypoparathyroidism

- >Total, subtotal q Near total thyroidectomy
- But, incase of recurrence in previously dissected (Near & Sub total thyroidectomy)

11

Dissection of neck - difficult

i) Most common - Hemorrhage

ii) Injury to nerve

ELN RLN

(upper pole) (Lower pole)

Incase of, thyroid surgery: ELN > RLN injury

I) ELN injury

Unilateral Bilateral injury

Patient presents with hoarseness

a) RLN injury

Unilateral Bilateral injury

Bilateral injury

iii) Post-operative respiratory distress

Presentation - Hoarseness

- Laryngeal edema [most common]
- Bilateral (B/L) RLN injury
- Laryngomalacia
- Tension hematoma

1

management - removal of sutures and evacuation of hematoma

- Hypoparathyroidism (Late → 48 72 hrs)
- Hypothyroidism

Hypoparathyroidism

00:58:42

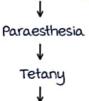
Presentation - Life threatening

- Aspiration

- Aphonia

- 1. Cause vascular insult to the parathyroid glands
- a. Symptoms

manifests after 48 to 72 hours



Respiratory distress [cause of death]

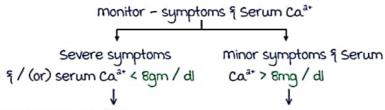
3. Signs



i) Trousseau's sign

- \bullet Carpopedal spasm caused by inflating the blood pressure cuff above Systolic ΘP .
 - also known as obstetrician's hand deformity
- ii) Chovstek's sign
- Twitching of facial muscles in response to tapping over the area of facial nerve.

The above signs are seen due to neuromuscular hyperexcitability 4. Management



- Ca^{a+} gluconate (I.V)
- Oral Ca^{a+}

Oral calcium

Oral vitamin D3

Oral vitamin D3

5. Permanent Hyperparathyroidism

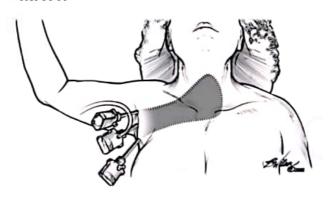
- Seen in 1 2% cases
- Hyperparathyroidism persisting for > 1yr following thyroid surgery



Joll's thyroid retractor

a. MIVAT

MIVAT



- Minimally Inasive Video Assisted Thyroid surgery Approach:
 - most common approach → Transaxillary
 - Via Nipples
 - Retroauricular approach
 - Transoral approach

Indications

- Thyroid swelling < 3cm in size
- T1 Papillary thyroid cancer
- Parathyroid adenoma

Contraindications

- Thyroiditis
- Large nodule

THYROID - 2

Hyperthyroidism

00:00:14

Clinical features: Thin

Irritable

weight loss

Diarrhoea

Tremors

Tachycardia

Heat intolerance

Oligomenorrhea

Causes:

- 1. Graves disease (m.c) [1 uptake on thyroid scan]
- a. Solitary toxic nodule / adenoma associated with G coupled shock protein
- 3. Plummer's disease (Toxic nodular goitre)
- 4. TSH secreting pituitary adenoma TSH 1 1
- 5. Jod-Basedow phenomenon: lodine induced hyperthyroidism
- 6. Factitious hyperthyroidism (exogenous in take of thyroxine)
- 7. Struma ovarii
 - ectopic thyroid tissue in ovary
- 8. Apathetic hyperthyroidism in elderly patients
 - overt clinical signs and symptoms (

Note:

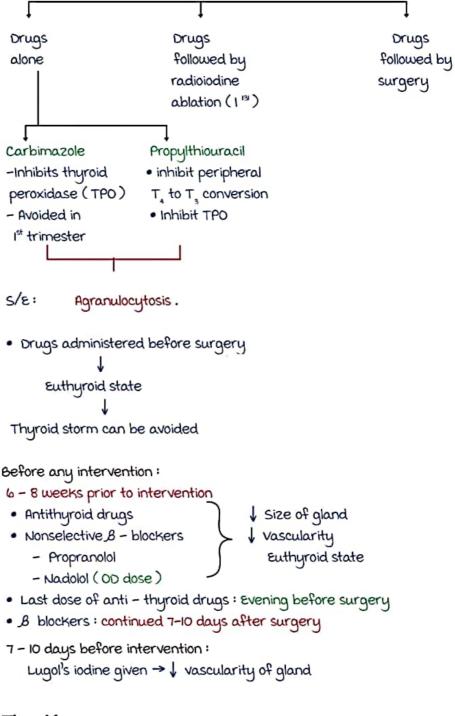
Factitious hyperthyroidism & struma ovarii

→ no increase in uptake during thyroid scan

Feature of hyperthyroidism + Low TSH

Thyroid scan

Active space



Thyroid storm

00:13:25

Uncontrolled thyrotoxicosis

Before surgery

During surgery

(Rough handling

of gland)

- · mc cause (overall)
 - → Inadequate preparation
- Stress
- · upper respiratory tract infections (viral)

Clinical features:

- Tachycardia → Arryhthmias (Leading cause of death)
- Dehydration
- Confusion
- · Hyperthermia

management:

- 1. Aggressive IV fluid therapy
- a. cool the patient
- 3. IV steroids
- 4. Large doses of carbimazole

Grave's disease

00:17:09

- Autoimmune, Female > male
- Autoantibodies [stimulating] against thyroid receptor
 Earlier Known as→LAST [Long acting thyroid stimulating antibodies]
 Now → TSH receptor antibodies

Associated conditions:

Addison's disease

myasthenia gravis

Pernicious anaemia

HLA-DR3/B8

HPE: Tall columnar cells Scalloping of colloid

Clinical features:

- -Feature of hyperthyroidism
- Pretibial myxedema
- -Thyroid Acropachy → subperiosteal bone formation
- Eye signs:
 - 1. Exophthalmos
 - a. Stellwag's sign Infrequent blinking
 - 3. Dalrymple's sign lid retraction
 - 4. Von Graefe's sign lid lag
 - 5. Joffroy's sign absence of forehead wrinkling
 - 6. moebius sign loss of accommodation reflex

Active space

Thyroid scan: Diffuse 1 in uptake

Diagnosis: clinical features and antibody levels

Management of Grave's disease

00:22:47

1. In a child -> Drugs only

a. Pregnant woman → propylthiouracil (PTU)

- 3. Adult without goitre → > 45 year : Drugs followed by radioiodine ablation (RIA)
- 4. Adult with goitre → Drugs followed by surgery
- 5. Elderly patients with co-morbid conditions
 - → Drugs followed by radioiodine ablation
- 6. Eye sign (→ Drugs followed by surgery
 - .. RIA can worsen eye signs

Surgical option for Grave's disease

	Total Thyroidectomy	Subtotal thyroidectomy
 Control of toxicity Return to euthyroid state 	Immediate Immediate	Immediate Variable - upto 12 months
3. Recurrence risk4. Risk of thyroidfailure	None 100%	Lifelong — upto 5% Lifelong — upto 30%
5. Risk of permanent hypoparathyroidism	5%	1%
6. Need for follow-up	minimal	Lifelong

- Preferred modality → Total thyroidectomy
- Toxic nodular goitre (Plummer disease) management: Drugs followed by total thyroidectomy
- Solitary toxic nodule.
 - > 45 years -> drugs followed by RIA.

```
    Clinical features: Dull, lethargic patient
        Alopecia
        Bradycardia
        Constipation
        Weight gain
        Cold intolerance
        menorrhagia
        T3 ↓ T5 ↓ T5 ↑
```

Causes:

I. lodine deficiency (mc overall)in western countries: Hashimoto's thyroiditis

- a. Wolff chaikoff syndrome
 - lodine induced hypothyroidism
- 3. Non functioning pituitary adenoma
- 4. Sheehan's syndrome postpartum pituitary hemorrhage.
- 5. Dyshormonogenesis defect in thyroperoxidase enzyme
- 6. Euthyroid sick syndromes
 non thyroidal disorders causing ↓ T3 9 T4 but TSH → normal
- 7. Refetoff syndrome

end organ resistance to T4 TSH normal

Hashimoto's thyroiditis

00:31:35

- · A/K/A Lymphocytic thyroiditis
- Autoimmune, females > males
- Associated with: HLA-DR3 / BB

Down's syndrome Turner's syndrome

Auto antibodies

Blocking antibodies against—Thyroid receptor TPO enzyme Thyroglobin

Clinical features:

Auto antibodies

Stimulate lymphocytes

Infiltrate gland

Stored hormone released into circulation

(Transient hyperthyroidism)

phase of Hashitoxicosis



Repeated attacks and destruction of follicles



No regeneration



Prolonged hypothyroidism

Features:

Diffuse enlargement of gland Long standing Hashimoto's → Lymphoma

On HPE:

Lymphocytic infiltration Hurthle cells → also seen in: thyroid lymphoma Hurthle cell cancer Follicular thyroid cancer

Diagnosis:

Autoantibody levels

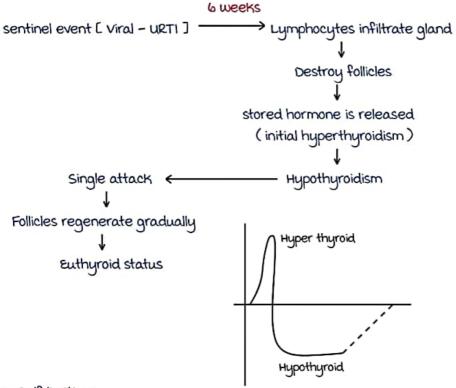
management:

Thyroxine replacement if diffuse goitre + → surgery

De Quervain / viral / granulomatous thyroiditis

00:37:21

- · Type of subacute thyroiditis
- HLA-B 35 association



- Self limiting
- ↑ ESR

Note: ↑ ESR 9 HLA-B 35 → help differentiate De Quervain 9 postpartum thyroiditis

Painful neck enlargement

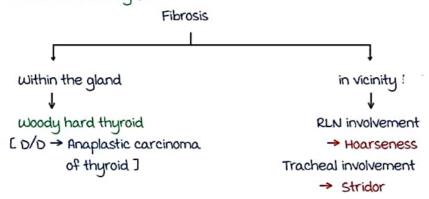
management

- Steroids
- symptomatic management

Riedel's thyroiditis

00:41:35

- · A/K/A Fibrosing thyroiditis
- Associated with 196 4



Active space

100:- Tru-Cut biopsy

Features

Diffuse enlargement of gland painless neck enlargement

management

- Steroids
- Tamoxifen
- Thyroxine replacement → if required

Associated with

- Peyronie's disease
- Dupuytren's contracture

THYROID - 3

Thyroid cancers

80:00:00

Syndromes causing thyroid cancers

- I. Familial adenomatous polyposis \rightarrow Papillary thyroid cancer (PTC) due to APC gene mutation
- a. Gardner's syndrome -> Follicular thyroid cancer (FTC)
- 3. Werner Syndrome.

wrn I gene

Progeroid syndrome

PTC / FTC / Hurthle cell cancer

4. MEN a syndrome.

medulary thyroid cancer (MTC) due to RET gene mutation.

5. Cowden syndrome - PTEN mutation

GI polyps

Breast cancer

Thyroid cancer - FTC / PTC.

6. mccune-Albright Syndrome.

Fibrous dysplasia

7. Carney complex

Y PPAR gene mutation

Batman syndrome:

Breast

Adrenal

Thyroid

ma - Atrial myxomas

Naevus.

Staging of thyroid cancers

00:03:15

	TNM definitions (AJCC 8e)
for papi	lary, follicular, poorly differentiated, Hürthle cell, medullary, and anaplastic thyroid carcinomas
TX	Primary tumor cannot be assessed
TO	No evidence of primary tumor
T1	Tumor ≤ 2 cm in greatest dimension limited to the thyroid
T1a	Tumor ≤ 1 cm in greatest dimension limited to the thyroid
T1b	Tumor > 1 cm but ≤ 2 cm in greatest dimension limited to the thyroid
T2 T3*	Tumor > 2 cm but ≤ 4 cm in greatest dimension limited to the thyroid
	Tumor > 4 cm limited to the thyroid or gross extrathyroidal extension invading only strap muscles
T3a*	Tumor > 4 cm limited to the thyroid
T3b*	Gross extrathyroidal extension invading only strap muscles (sternohyoid) from a tumor of any size
T4	Includes gross extrathyroidal extension into major neck structures
T4a	Gross extrathyroidal extension invading subcutaneous soft tissues, larynx, trachea, esophagus,
	or recurrent laryngeal nerve from a tumor of any size
T4b	Gross extrathyroidal extension invading prevertebral fascia or encasing carotid artery
	or mediastinal vessels from a tumor of any size

Nodal involvement:

N_o → no nodes

N → Level 6 lymph nodes / Delphian nodes

NX	Regional lymph nodes cannot be assessed
NO	No evidence of regional lymph nodes metastasis
N0a*	One or more cytologic or histologically confirmed benign lymph node
N0b°	No radiologic or clinical evidence of locoregional lymph node metastasis
N1*	Metastasis to regional nodes
N1a*	Metastasis to level VI or VII (pretracheal, paratracheal, or prelaryngeal/Delphian, or upper mediastinal) lymph nodes; this can be unilateral or bilateral disease
N1b*	Metastasis to unilateral, bilateral, or contralateral lateral neck lymph nodes (levels I, II, III, IV, or V, or retropharyngeal lymph nodes
MO	No distant metastasis
M1	Distant metastasis

Differentiated Thyroid Cancer (DTC) - PTC, FTC, Hurthle cell cancer 8th American Joint Committee on Cancer changes

DTC	1.	The age cutoff used for staging was increased from 45 to 55 years of age at diagnosis.
	2.	Minor extrathyroidal extension detected only on histological examination was removed from the definition of T3 disease and therefore has no impact on either T category or overall stage.
	3.	N1 disease no longer upstages a patient to stage III. If < 55 years of age at diagnosis, N1 disease is stage I. If ≥ 55 years of age, N1 disease is stage II.
	4.	T3a is a new category for tumors > 4 cm confined to the thyroid gland
	5.	T3b is a new category for tumors of any size demonstrating gross extrathyroidal extension into strap muscles (sternohyoid, sternothyroid, thyrohyoid, or omohyoid muscles)
	6.	Level VII lymph nodes, previously classified as lateral neck lymph nodes (N1b) were re-classified as central neck lymph nodes (N1a) to be more anatomically consistent and because level VII presented significant coding difficulties for tumor registrars, clinicians, and researchers.

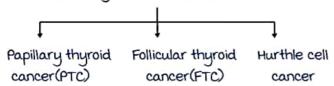
Minor extrathyroidal extension to strap muscles \rightarrow T3b

Anaplastic cancer

Staged same way as DTC

Anaplastic	1.	Unlike previous editions where all anaplastic thyroid cancers were classified as T4 disease, anaplastic cancers will now use the same T definitions as differentiated thyroid cancer.
	2.	Intrathyroidal disease is stage IVA, gross extrathyroidal extension or cervical lymph node metastases is stage IVB, and distant metastases are stage IVC

Differentiated Thyroid Cancer (DTC)



Papillary thyroid cancer.

- · m.c in iodine sufficient areas overall.
- · Females > males
- · 3rd 4th decade of life.

Risk factors:

1. Radiation exposure

PTC associated with radiation exposure are more aggressive.

a. Long standing thyroglossal cyst

Genetics:

- · m.c gene BRAF
- Glial derived neurotrophic factor (GDNF)
- · RET / PTC mutations

Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with Marrow Edition 4 videos.

Features:

Swelling (m.c)

microcarcinoma / occult carcinomas: < Icm in size.

Cyst

multifocal in origin

Lymphatic spread more common.

level 6 / Delphian Lymph nodes

Lateral aberrant thyroid:

Lymph node metastasis from an occult PTC.

LN palpable

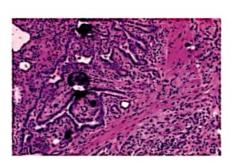
Hematogenous spread: m.c → Lungs

Active space

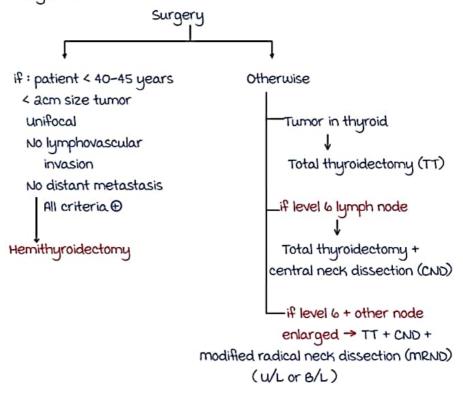
confirmed by FNAC.

HPE:

- Psammoma bodies → Foci of dystrophic calcification.
- a. Orphan Annie-eye nuclei
- 3. Nuclear grooving.



management:



T3, T4 tumor: Prophylactic level 6 clearance

After surgery

↓

Identify if residual disease⊕

or metastasis⊕

↓

Whole body iodine scan

Pre requisites: TSH > 20 mu/L

Preparation for iodine scan:

Conventional: Thyroxine not given for 4-6 weeks after surgery.

New method: Recombinant TSH injection

Single dose of Radioiodine ablation

· Also given in : Persistently high thyroglobin after treatment

serum thyroglobin (Tumour marker of DTC)

if serum Thyroglobin > a ng / ml.

Suspect recurrence

Whole body iodine scan

Note:

· If patient has anti-thyroglobin antibodies Thyroglobin not a reliable marker

- If tumor resistant to Radioiodine ablation → EBRT (External beam radiotherapy)
- PTC → best prognosis.

Lindsay tumor:

Follicular variant of papillary cancer

Follicular Thyroid Cancer (FTC)

00:33:31

- · and mc overall
- mc in iodine deficient areas

Risk factors:

Long standing multinodular goitre.

Pulsatile bony metastasis

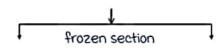
Presentation:

swelling

Diagnosis: FNAC → cannot differentiate between follicular adenoma q carcinoma.

Follicular neoplasm

Hemithyroidectomy



Follicular carcinoma Adenoma No further surgery Surgical principles similar to PTC

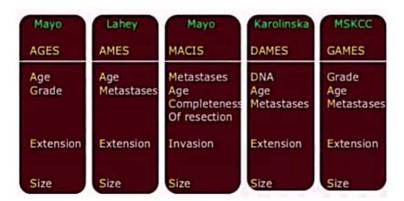
Post - op period & Follow - up → same as PTC

Prognosis: Bad compared to PTC

Hurthle cell carcinoma

- · Earlier considered as variant of FTC
- more aggressive than classical FTC
- Higher bony metastasis rate

Prognostic factors:



- macis → Post-Operative score.
- Young patient: Good prognosis
 > 50 yrs : Bad prognosis
- Capsular invasion⊕or size > 4cm → Bad prognosis

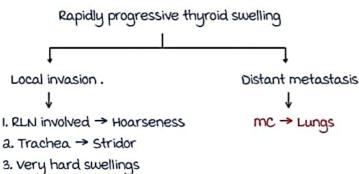
most important prognostic factor: Age.

Anaplastic thyroid carcinoma

00:43:30

- Worst prognosis
- Least common type
- 5-7th decade
- · p53 mutation.
- miRNA 17 92 upregulation
- B-catenin mutation.

Clinical features:



```
Diagnosis: FNAC
   if FNAC inconclusive → Tru-Cut biopsy
management
   Staging same as DTC.
1. If tumor restricted to thyroid.
    Aggressive surgery (TT + CND + MRND)
```

- a. If tumor is beyond thyroid: Palliative management.
 - Chemotherapy
 - Dabrafenib

(Tyrosine Kinase inhibitor used in metaplastic & anaplastic carcinoma)

If pressure over trachea → Isthmusectomy.

Thyroid lymphoma

00:49:30

- 5-7th decade
- Non Hodgkins B cell lymphoma

Clinical features:

Thyroid swelling.

'B' symptoms - Fever

Night sweats weight loss

FNAC cannot characterize lymphoma

.. Tru-Cut biopsy done

management:

Chemotherapy

R - Rituximab [CD 20 inhibitor]

c - cyclophosphamide.

H - Hydroxydaunorubicin.

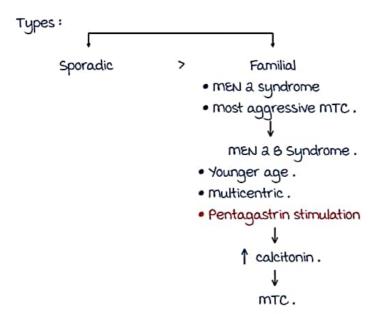
0 - Oncovin.

P - Prednisolone

Followed by Radiotherapy.

If residual / recurrent disease → Surgery.

- Parafollicular 'C' cells
 Secrete calcitonin
- · Arise from ultimobranchial bodies from neural crest



Features:

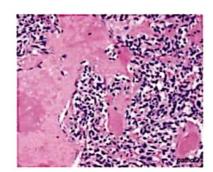
- Thyroid swelling
- Diarrhoea [due to serotonin]
- Flushing [histamine]
- Cushing disease [ACTH]
- multifocal
- Lymphatic 9 hematogenous spread.

Level 6 nodes

Liver (m.c)

- Aggressive tumors.
- CEA can be raised.

Diagnosis: FNAC → Amyloid rich stroma.



```
management:
```

Surgery

1. If restricted to thyroid: TT + CND.

thyroid + level 6 nodes + other nodes

Note:

No role of Iodine scan & Radioiodine ablation (RIA) in MTC

metastatic mTC:

```
Vandetanib
                  Tyrosine Kinase inhibitors
```

Note:

Always rule out pheochromocytoma in patients with MTC

MEN syndrome

01:01:40

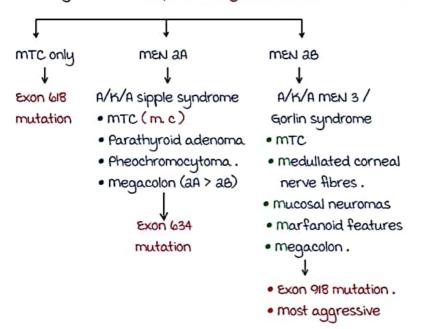
- Multiple Endocrine Neoplasia Syndrome
- MEN I / Wermer syndrome :
 - menin gene mutation Chromosome II
 - Pituitary adenoma mc → Prolactinoma
 - Parathyroid adenoma mc clinical association (95%)
 - Pancreatic endocrine tumours

(mc pancreatic endocrine neoplasm)



- Adrenocortical tumors
- Thymic tumors
- Collagenoma.

MEN a syndrome - RET proto-oncogene mutation (chromosome 10)



Any patient with MEN a syndrome

Ist degree relatives screened for RET mutation.

Low risk Medium risk High risk.

Exon 768, 790 Exon 618, 634 Exon 918

Prophylactic thyroidectomy

• at a0 years

• 5-6 yrs

I year of life.

MEN 4 syndrome:

- CDKN1B gene mutation chromosome 12
- Pituitary adenomas
- Parathyroid adenomas
- Renal tumours
- Adrenal tumors
- Reproductive organ tumors

Active space

PARATHYROID

Anatomy of parathyroid glands, hypoparathyroidism & hyperparathyroidism 00:00:09 Anatomy 4 parathyroid glands Supplied by: inferior thyroid artery Development of parathyroids : → superior parathyroids → 4th Arch → Inferior parathyroids, and thymus → 3rd Arch variable location. 5% → 5 parathyroid glands Hypoparathyroidism m.c → latrogenic • Di George syndrome (A/K/A catch - aa) → Deletion of aaq II → Features: mnemonic → CATCH C → Cardiac defects A → Atypical facies T → Thymic hypoplosia C → Cleft lip and palate H → Hypocalcemia Hyperparathyroidism Clinical features: Mnemonic: Bones, Stones, abdominal groans, psychiatric overtones → Pathological fracture → Subperiosteal bone resorption (radial aspect) → Salt and pepper skull \rightarrow 8rown Tumors (osteitis fibrosa cystica) \rightarrow von Recklingproximal myopathy hausen disease →multiple and recurrent renal stones (m. C symptomatic manifestation) →Nephrocalcinosis Abdominal -- colicky groans Pancreatitis

Peptic ulcers

Corneal deposition (CaPO, crystals)

Primary hyperparathryroidism

00:06:51

```
    Risk: Radiation exposure to neck

    Associated with: men I and aA syndrome

                   → multiglandular disease (5%)

 Biochemical tests: Serum Ca<sup>a+</sup> 1

                    Serum PTH 1
                    Serum PO, 1
                    urinary caa+ and PO, 1
· cause:
                                       Hyperplasia
        Adenoma
            → single gland
                                            All glands
                                            Involved
              enlarged
  → most sensitive test to localise parathyroid tissue
                Tc99 Sestamibi scan
                Localises to mitochondria
                (False 🛛 → Hurthle cell Tumor)
  → SPECT (single photon emission CT)
· mangement : Adenoma
           → surgery:
               Removal of adenomatous gland
   Intra - operative PTH Assay
    → PTH 1/a Life: 5-7 minutes
                                      Intra operative
       pre-operative
        PTH
                                        PTH within
                         gland
                                       10 minutes of
        measured
                                          removal
                                        If ≥ 50% drop in PTH,
                                        adenomatous gland removed
```

(miami Protocol)

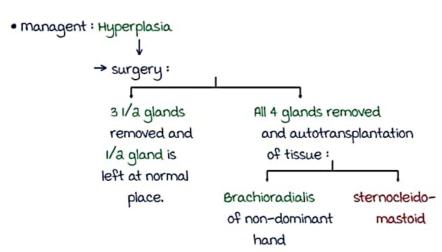
- → minimally invasive surgery
 - - multigland disease
 - Familial syndromes
 - Lithium induced
- → Thymectomy (cervical)
 - done in 10 hyperparathyroidism if involves lower parathyroids
 - in 1° hyperparathyroidism with familial syndromes
 - in a hyperparathyroidism
- After parathyroid surgery

hungry bone syndrome

bones actively take up caat

Hypocalcemia

Management of 1° hyperparathyroidism in hyperplasia 00:18:28



Hyperparathyroidism type

Residual

hyperparathyroidism

→ Raised PTH within 6 weeks after surgery

Recurrent

hyperparathyroidism

- → Raised PTH after 6 months (But normal PTH for those 6 months)
- → Casanova test
 - To identify recurrence due to autotransplanted tissue

Active space

 — ⊕ Test : a0 times higher value
 in Brachial vessel

Indications for surgery in asymptomatic 1° hyperparathyroidism:

Measurement	Indication for Surgery ^{a,b}	
Age	< 50 years	
Serum calcium	> 1 mg/dL (> 0.25 mmol/L) above upper limit of normal	
Bone mineral density	(a) t-score of ≤ 2.5 (osteoporosis)(b) Vertebral fracture on imaging study	
Creatinine clearance	 (a) Reduced to < 60 mL/min (b) 24-hour urine for calcium > 400 mg/day and increased stone risk by biochemical stone risk analysis (c) Nephrolithiasis or nephrocalcinosis on imaging study 	

Secondary hyperparathyroidism & calciphylaxis

00:26:26

a° Hyperparathyroidism

- causes:
 - 1. Long standing (chronic renal failure)
 - a. Intestinal malabsorption
 - 3. Lithium intake
 - 4. Vit D, deficiency
- Associated with Fibroblast growth factor a3
- management: correction of CRF
 -
 - Vit D3
 - Oral Caa+
 - Calcimimetic drugs
 - → Cinacalcet
 - → ↑ sensitivity of Caa+ receptors
 - Surgery
 - Renal transplant

calciphylaxis

- Hypercalcemic Uremic arteriopathy
- Deposition of Ca^{a+} in blood vessels, subcutaneous tissue
- Painful pruritic nodules in skin

- gangrene
- Management : urgent Parathyroidectomy
 Calcimimetic Agents

Tertiary hyperparathyroidism & pseudohyperparathroidism

00:31:22

- 3° Hyperparathyroidism
- · seen in:
- 1. Chronic renal failure
- a. Post renal transplant

One of the glands can undergo adenomatous change



management: Surgery

Pseudohyperparathyroidism

- A/K/A Hypercalcemia of malignancy
- m. C paraneoplastic syndrome
- · m. C seen in squamous cell carcinoma of lungs
- medical emergency
- · Clinical Features : Confusion
 - Dehydration
 - Vomiting
 - ECG changes
 - → ↑ PR interval
 - → shortened QT interval
- Management : 1. Aggressive 1.V fluid therapy
 - a. Once hydration is adequate -> Furosemide
 - 3. Bisphosphonates
 - → Zoledronic acid

Parathyroid cancer

00:35:54

- · 1%
- Risk factors:
 - 1. Radiation exposure
 - a. Hyperparathyroidism

Jaw tumor syndrome (ossifying jaw tumor)

- due to HRPT a gene (parafibromin) inactivation
- m = F
- m . C cause of death: Symptomatic hypercalcemia
- HPE: Fibrous bands

- Vascular invasion
- — ↑ mitotic figures
- · Immuno histo chemistry: Inactivation of parafibromin
 - PGP 9.5 (H)
- management: Ro resection
 - Chemotherapy has no benefit
 - Drugs : Cinacalcet

Azidothymidine

Octreotide

Parathyroid immuno therapy

ADRENAL GLAND AND NET

Adrenal gland - incidentaloma

00:00:38

```
Adrenal incidentaloma:

Cause: Non-functioning adenoma (75%)

Cushing sydrome (8%)

Adrenal metastasis (2%)

B-Breast (m.c)

L -> Lung

R -> Renal

Carcinoma (2%)
```

- Rule out →functional tumours, pheochromocytoma
 Workup:
 - Dexamethasone suppression test
 - Plasma fractionated metanephrines
 - Serum electrolytes
 - Serum DHEA
 - Serum Metanephrines
 - urinary cortisol

Imaging: MRI > CECT

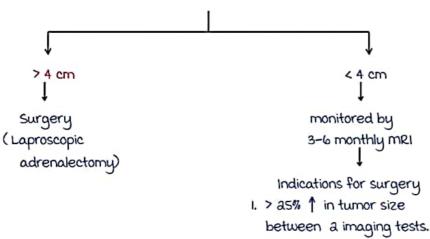
FNAC → only indicated if suspicion of metastasis⊕

- Rule out pheochromocytoma before FNAC

management:

Functional tumor / pheochromocytoma → manage accordingly





a. Suspicion of malignancy

Catecholamine producing tumors

Adrenal extra-adrenal

Pheochromocytoma Site: medulla paraganglioma

1. mc site- organ of

2uckerkandl

(sympathetic chain)

a. Parasympathetic chainm.c site ->carotid body

Rule of 10%

- 10% B/L
- 10% Extra- adrenal
- 10% Familial
- 10% children

Types



- m = F
- · 4th / 5th decade

- m = F
- occur earlier
- · B/L
- mc→ Neurofibromatosis-I (NF-I)
- a. MEN a sydrome (Benign)
- 3. Sturge Weber sydrome
- 4. VHL syndrome
- Familial paraganglioma Syndrome (mutation of Succinyl dehydrogenase (SDH) 8 and C.)

Note:

If metastasis ⊕ → malignant pheochromocytoma.

Diagnosis of pheochromocytoma

00:13:18

PASS score (Pheochromocytoma in Adrenal gland Scale Score)

- Ki 67
- Vascular invasion
- Capsular invasion

Gland and NET

HPE: Zellballen pattern / salt & pepper nuclei Immunohistochemistry (IHC): synaptophysin chromogranin

Gross section: greyish pink tumour with areas of haemorrhage 9 necrosis

Catecholamines released:

- Adrenal pheochromocytoma: Noradrenaline (NA) > Adrenaline
- Paraganglioma: Noradrenaline
 C Deficient in phenyl ethanolamine N-methyl trasferase alpha blocker]
- malignant pheochromocytoma: dopamine, homovanillic acid
- MEN syndrome: Adrenaline > Noradrenaline

Clinical features:

Classical triad: Tachycardia

Sweating

Headache (MC presenting symptom)

MC feature: hypertension

majority

small proportion

Episodic HTN Continuous HTN

Investigations:

- screening test: a4 hr urinary VMA / metanephrines.
 L VMA → Vanillylmandelic acid]
- Plasma fractionated metanephrines (most sensitive test)
- Imaging 10c : mR1 > CECT
 T₂W mR1 : light bulb sign
- Extra-adrenal pheochromocytoma/ malignant pheochromocytoma/ with metastasis



Light bulb sign

IOC :Ga69 DOTA-TATE scan

If patient diagnosed at young age -> Germline mutation tests done

Management of pheochromocytoma

00:23:01

- α -Blocker → Phenoxybenzamine (10 mg 00)
- β Blocker added \Rightarrow If tachycardia \oplus

Surgery:

- Laproscopic adrenalectomy (open procedure -> only for very large tumors)
- Adrenal vein ligation → sudden ↓ in BP

metastasis:

- To bones, lungs & liver
- Drugs: mitotane

Chemotherapy → Dacarbazine

vincristine

Pheochromocytoma during pregnancy:

1st q and trimester → ∝-blocker

1

Followed by surgery

 3^{rd} trimester \rightarrow Elective LSCS after \propto - blockade.

1

Followed by adrenalectomy after few weeks

Adrenocortical carcinoma

00:28:03

Bimodal distribution → children(st spike)

4th decade(and spike)

- Female > male (1.5:1)
- · Non functional > Functional
 - more aggressive
 - Poorer prognosis
 - Hormonal assay can be used to monitor

Clinical features:

- pain, lump
- If functional → cushing syndrome (m.C)

malignant potential:

- Size
- Necrosis
- Capsular / vascular invasion

IOC: MRI > CECT

- Rule out functional tumours

macfarlane staging:

Stage i: < 5cm

11:>5cm

111: locally invasive.

iv: distant metastasis

NET

management:

surgery → open adrenalectomy

Aim → Ro resection

metastatic disease:

- chemotherapy → Etoposide cisplatin
- mitotane
- Ketoconazole

Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with marrow Edition 4 videos.

Neuroblastoma:

00:33:35

- malignant tumour → arise from sympathetic nervous system
- mc site: Adrenal medulla > paravertebral sympathetic chain
- mc abdominal malignancy in children
- <5 years of age.

Types:

- 1. Sporadic
- a. Familial -> ALK mutation.

HPE:

Intratumoral calcifications
Homer Wright rosettes
Small round blue cell tumor

IHC:

Positive for- synaptophysin chromogranin

Clinical feature:

- Abdominal lump → cross the midline
- metastasis (70%)

a) Blueberry muffin lesions.



b) Racoon eyes.



- c) Dancing eyes (Opsoclonus-myoclonus)
- D) metastasis to liver, lungs

IOC: MRI > CT

IF METS \oplus > mIBG (metaiodobenzylguanidine) Scan.

Rule out functional disease:

- Serum cortisol
- Homovanillic acid
- metanephrine.

Staging → Bone marrow aspirate

management

- -Surgery
- Chemotherapy → Etoposide Cisplatin

high risk patient low risk patients medium risk patient Neoadjuvant surgery surgery [consider chemotherapy] chemotherapy chemotherapy surgical removal

Neuroendocrine tumors (NET)

00:41:07



NET

Distribution Of neuroendocrine tumours:

Site	Distribution (%)
Lung	10
stomach	5
Duodenum	a
Small bowel (ileal)	a5
appendix (m.c)	40
Colon	6
Rectum	15

Foregut carcinoids

-Drain into systemic veins

serotonin not produced

- Chromogranin A secreted into blood

metastasis ⊕ → m.c: Bones

midgut carcinoids:

mc → Appendicular carcinoids

Serotonin secretion ①



Portal vein



I

metabolized

.. no carcinoid syndrome.

If liver metastasis ⊕ → Cause carcinoid syndrome

mc site of metastasis in midgut→ Liver

Clinical featues:

mc (overall): flushing

mc symptom of abdominal carcinoids → pain

Carcinoid syndrome

00:47:17

Patient presents with

- Bronchospasm
- · Diarrhea
- Flushing (m.c)
- Cardiac lesion 1:

Tricuspid regurgitation > Pulmonary regurgitation > Pulmonary stenosis

Clinical features and investigations

1. Urinary 5 HIAA (Hydroxyindoleacetic acid)

a. Blood: Chromogranin A can be measured

Imaging:

Serotonin receptor scintigraphy (SRS)

A/K/A octreotide scan.

management



Surgery

If malignant / metastasis ①

- Chemotherapy
 - Cisplatin
 - 5 FU
- octreotide

Appendicular carcinoids:

Tumor < a cm size or >acm away from base

Tumour > acm size or < acm from base

Right hemicolectomy

simple appendicectomy

Gastric carcinoids / NET

00:51:58

Classification:

	Gassification.				
Type	Histological pattern	size and location	causative factor and		
			prognosis		
ı.	Benign, non-function,	Gastric corpus;	ECLomas in chronic		
	well-differentiated	< 1 cm mucosa	atrophic gastritis,		
		/submucosa	hypergastrinaemia		
a.	Benign or low-grade	1-acm, angioinvasion	ECLomas with		
	malignant,	mucosa/	hypergastrinaemia		
	differentiated	submucosa	results of gastrinoma		
			in MEN I		
3.	Low-grade malignant,	acm, invasion	Sporadic ECLomas not		
	differentiated	beyond submucosa	related to		
		9	hypergastrinaemia		
4.	Intermediate or small	different size	causative factor		
	cell type , high- grade		unknown, poor		
	3. 0 0		prognosis		
	1				

NET

Type I:

- · mc
- Elderly females
 - 1 Gastric due to Gastric atrophy
 - Pernicious anemia.
- Endoscopic resection.

Indications for antrectomy:

- > 1 cm size & infiltration of wall
- recurrent
- ->6 in number

Type II:

Agastrin due to MEN 1 syndrome.

management same as type i.

Type III:

Sporadic, solitary

Gastrin - normal

Upper G1 haemorrhage

> a cm in size

Liver metastasis common

management:

Gastrectomy

Liver lesion → chemoembolization.

Type IV:

- Large ulcerated lesion.
- Similar to adenocarcinoma.
- Bad prognosis

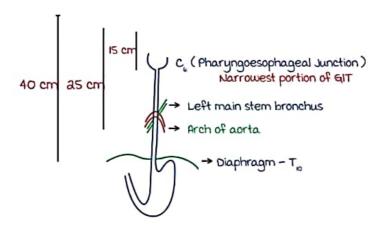
OESOPHAGUS - 1

Surgical anatomy of oesophagus

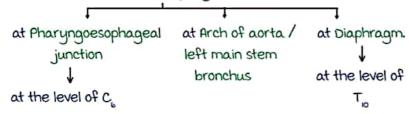
00:00:16

• Oesophagus is a muscular tube - starts at the level of C

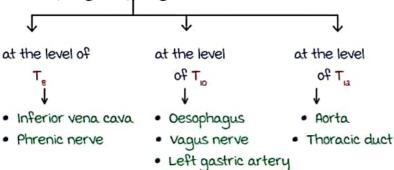
u - upper incision



Three constrictions in oesophagus



The diaphragmal openings



• At the level of C, - Narrowest portion of GIT

if a foreign body gets

impacted

latrogenic

perforations

Endoscopic removal

Oesophagus - blood supply, lymphatics

00:07:19

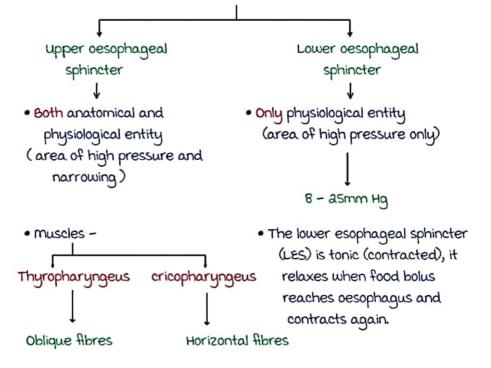
It has segmental blood supply

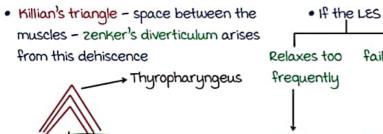
	Arteries	veins
upper 1/3 rd (cervical)	 Inferior thyroid artery 	Inferior thyroid vein
middle (Thoracic)	Descending thoracic aortaBronchial aorta	Azygous vein
Lower 1/3 rd	• Left gastric artery In mallory weiss tear left gastric artery bleeds	left gastric vein or coronary vein Drains into Portal vein Liver metastasis from oesophageal cancer can enter liver through coronary vein

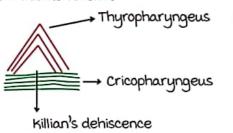
 Lymphatic drainage – lymphatics travel longitudinally skip metastasis / lesions in ca. oesophagus

Upper and lower oesophageal sphincter

00:12:16







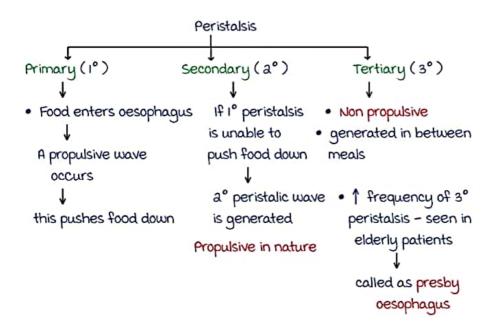
Oesophagus - peristalsis

00:18:32

fail to relax

Achalasia cardia

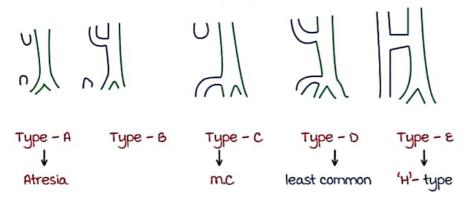
- The oesophagus lacks Serosa
- The strongest layer of oesophagus Submucosa



Congenital tracheo - esophageal fistula

00:22:53

Classification of tracheo – esophageal fistula (TEF)



Clinical features

- · It can be associated with N myc mutation
- Respiratory distress
- If oesophagus is not patent excessive dribbling of saliva
- At birth on suctioning the oral cavity

if increased secretions present

An orogastric tube is inserted → In TEF there is coiling of the tube.

Tracheo - oesophageal fistula - diagnosis

00:27:32

Diagnosis

- Confirmatory diagnosis contrast study (lohexol > Dinosil)
- If oesophagus is patent or distal end is communicating with trachea
 - the Air goes into stomach

This appears as fundal gas bubble

- IOC for H type combined tracheo- esophagoscopy
- Once diagnosis is confirmed

Rule out other congential anomalies

v - vertebral defects

A - Anorectal malformations

C - Cardiac defects - m.C

T______, Tracheoesophageal fistulas

R - Renal agenesis

L - Limb defects

Tracheo - esophageal fistula - management

00:31:31

· management - based on waterson's criteria

Birth weight presence or absence of pneumonia.

1) > a.5 kg

(-) → Definitive surgery

- Surgery Thoracotomy (posterolateral)
- For TEF type B, C, D, E Cameron Haight surgery

e.g - Procedure - in Type - C

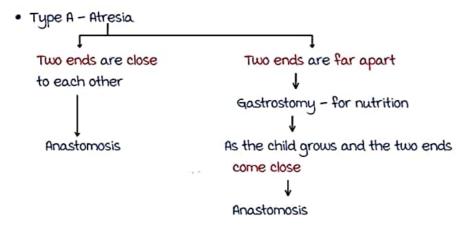
Step - 1 → cut the fistula step - 2 → Repair trachea (Polydioxanone sutures)

Step - 3 → Anastomose oesophagus.

m.c early complication of this surgery - Leak
m.c late complication of this surgery - Stricture at the anastomotic
site

Management of type - A tracheo esophageal fistula

00:37:50



Flourish device - Approved by US FDA

magnets inserted in both ends

They attract both ends

arouth

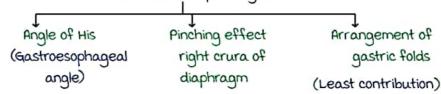
Active space

00:41:02

Length of the intrabdominal oesophagus - 3-5cm

most important factor which helps in maintining LES tone / in preventing reflux

Other factors which maintain patency of LES



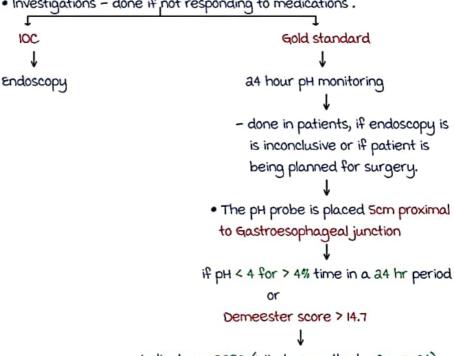
- GERD develops if length of intrabdominal oesophagus < acm if pressure < 6mm Hg
- Earliest pathophysiological indicator of reflux

TLOSR (Transient LES relaxation)

Gastro esophageal reflux diseaseclinical features, diagnosis

00:46:22

- Clinical features Retrosternal burning sensation (Heart burn) Bad taste in oral cavity Pharyngitis / laryngitis Dental caries
- Investigations done if not responding to medications.



Indicates - GERD (Wireless method - Bravo 24)

Lifestyle changes - Avoid food particles which relax (LES)

chocolates
fried / fatty food
spicy food
citrus fruits
tea / coffee.

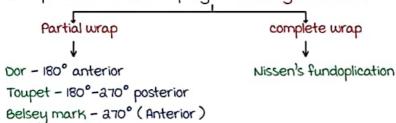
- Small frequent meals
- meals atleast a hours before going to bed.
- medications Prokinetic agents / PPI (proton pump inhibitors)
 Indication for surgery
- 1) If patient fails to respond to medical therapy
- a) If complications present Barret's oesophagus
 - Cancer
 - Stricture
- 3) If it is associated with Hiatal hernia

Gastro - esophageal reflux disease - surgery - fundoplication

00:56:34

Principles of fundoplication

- i) Restore adequate intraabdominal length Minimum 3 cm
- ii) Tighten diaphragmatic Crura around oesophaqus
- iii) Wrap fundus around oesophagus Shoe sign maneuver



Laparoscopic fundoplication

01:00:14

- 4 to 5 ports used for fundoplication
- 360° wrap

Complications of fundoplication

m.C intraoperative complication - Pneumothorax (while creating

pneumoperitoneum)

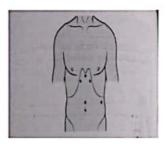
Larly complication

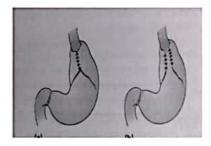
m.c overall complication - Gas bloat syndrome

System

(the stomach is tight around oesophagus -patient cannot relieve gas from stomach)

Therefore, Partial wrap or a Floppy Nissens is preferred.





Newer modalities - for management of GERD

Inject polymers - endoscopically around LES

1 recurrent rate - not preferred

- · Good long term results with Endoscopic RFA (Radiofrequency ablation)
- Linx device magnetic beads around LES
- Collis Gastroplasty To achieve adequate length of oesophagus

linear stapler is placed



Gastroesophageal reflux disease - complications

01:07:20

Barret's oesophagus

- Specialised intestinal metaplasia

Squamous epithelium of oesophagus

replaced by columnar epithellum

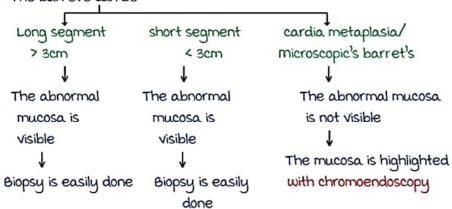
- ↑ risk of adenocarcinoma oesophagus
- · It develops in long standing GERD

- · Pathognomic feature Goblet cells
- C/F patients can be symptomatic or long term GERD
- Diagnosis Endoscopic biopsy

check for Goblet cells

Biopsy is taken from-Red velvety mucosa





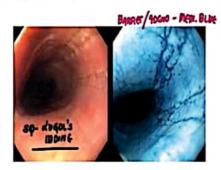
Barrett's esophagus



Chromoendoscopy and barret's oesophagus management 01:12:25

Chromoendoscopy

Highlight abnormal mucasa

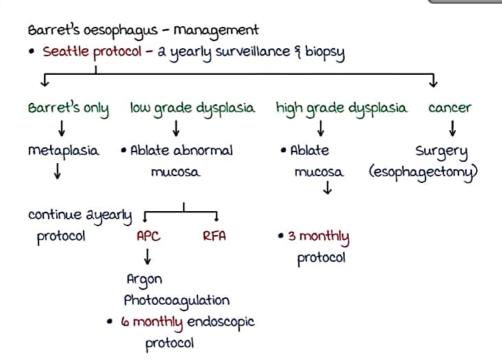


Lugol's iodine
 Used for
 Squamous epithelium

methylene blue

Used for barret³s and adenocarcinoma

Active space



OESOPHAGUS-2

Oesophageal Cancer

00:00:06

Squamous cell carcinoma (Scc)	Adenocarcinoma	
• m.c - overall	• m.c – in western world	
• m.c - in India	• m.c site - lower 1/3 rd	
• m.c site - middle 1/3 rd	 Risk factors 	
 Risk factors 	Obesity	
Smoking, Alcohol	GERD	
Preservative rich food	Smoking, Alcohol	
Smoked Food	CREST syndrome	
Tylosis - Autoimmune	(Scleroderma)	
↑ sec	(Adenocarcinoma > Scc)	
Palmoplantar Keratoderma	Barrett's esophagus	
Zenker ¹ s diverticulum	, ,	
Achalasia Cardia		
Vitamin & & selenium deficiency		
↓ ↓		
↑ risk		

Esophageal Cancer - clinical feature, diagnosis

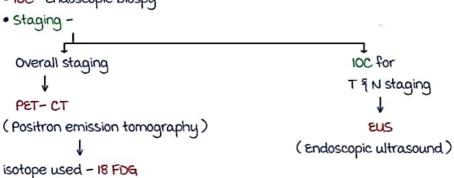
00:05:03

- Earliest feature Dysphagia
 Progressive dysphagia
 Difficulty to swallow solids > liquids

 weight loss
- Advanced signs Involvement of Lt. Recurrent laryngeal nervehoarseness of voice
 - malignant tracheoesophageal fistula - Chronic cough

Diagnosis:

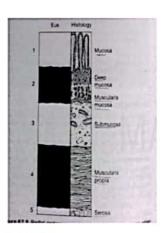
• 10c- Endoscopic biospy

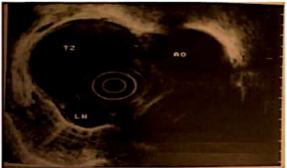


Endoscopic ultrasound



- mucosa white (hypoechoic)
- · muscularis mucosa Black
- · Submucosa white
- muscularis propria Black
- · Serosa White.





Advanced esophageal cancer with lymphnode involvement

Esophageal Cancer - Other investigations, TNM - Staging

00:11:09

Barium studies

· Barium swallow shows

Rat tail appearance (or)

Apple core appearance (also seen in colon cancer on barium enema.) Shouldering effect

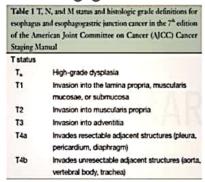
Achalasia cardia



Carcinoma esophagus



T, N, M Staging



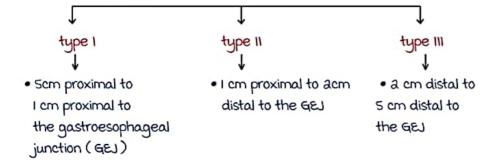
N status		
NO	No regional lymph node metastases	
N1	1 to 2 positive regional lymph nodes	
N2	3 to 6 positive regional lymph nodes	
N3	7 or more positive regional lymph node	
M status		
MO	No distant metastases	
M1	Distant metastases	
Histologic		
grade		
G1	Well differentiated	
G2	Moderately differentiated	
G3	Poorly differentiated	
G4	Undifferentiated	

m.c site of distant metastasis - liver

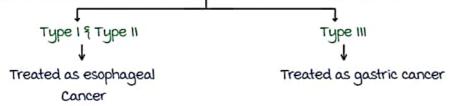
Siewert classification of gastro esophageal junction tumors

00:15:03

Siewert classification



The 8th AJCC (American Joint committee on cancer) update is -



Esophageal Cancer - 8th AJCC update

TI subcategorized as

Tla-Tumor invades the lamina propria or muscularis mucosae Tumors are above submucosa

So, amenable to endoscopic resection

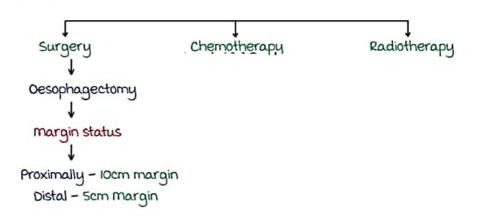
Tlb - Tumor invades submucosa

- T4a includes direct invasion of peritoneum
- G4 was eliminated

- Cancers of oesophagos-gastric junction that have their epicentres within proximal a cm of the gastric cardia are staged as esophageal cancer
- Those with epicentres >acm distal to esophago gastric junction,
 even if the esophagus is involved are staged as stomach cancers.

Oesophageal cancer - Management

00:18:32



Oesophageal cancer - Management-Types and complications of oesophagectomy

00:20:32

Transhiatal (orringer)	Ivor Lewis	mckeown (3 fleld esophagectomy)
Site of tumor Lower 1/3 rd Tumor mainly Sometimes mid 1/3 rd No. § site of incisions a incisions one at midline abdominal, other at left	 mid 1/3 rd tumors below aortic arch Sometimes - Lower 1/3rd tumors a incisions Abdominal Right 	upper 1/3 rd and mid 1/3 rd tumor (Above aortic arch) • 3 incisions Abdominal
neck Site of anastomosis - Neck	thorax Thorax	Thoracic Left Neck Neck

Complications of Ivor lewis

m.c complication - Atelectasis

leads to mediastinitis

· m.C long term complication - Stricture at anastomotic site

Complications of esophagectomy

· Neck anastomosis leaks more commonly

but majority are managed conservatively

· Chyle leak- Injury to thoracic duct

Esophageal replacement

· m.c used - Gastric tube

Based on Right gastroepiploeic (main) vessels
Right gastric vessel

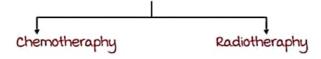
· if stomach is affected with acid or alkali injury

Colon (Preferred) or jejunum is used.

Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with Marrow Edition 4 videos.

Esophageal Cancer- Chemotherapy, Radiotherapy

00:32:27



- 5 Fluorouracil or cisplatin based
- Given in-lymph node positive advanced cancers
- Trials have shown Chemotherapy + Radiotheraphy

is better than Chemo or radiotheraphy alone

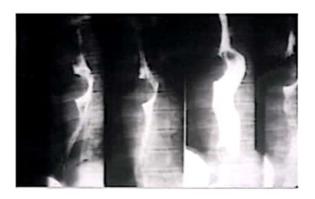
- In advanced cancers (T3/T4) Neo adjuvant chemotherapy
- most important Prognostic factor "T" stage / depth of invasion

Active space

Malignant tracheo-esophageal fistula, leiomyoma

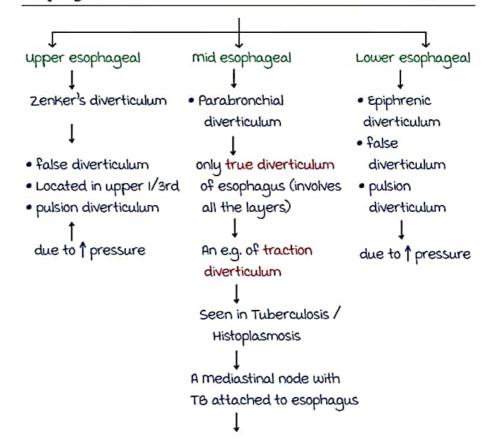
00:35:10

- · C/F Chronic cough
- Seen in middle 1/3rd tumors of esophagus
- management of choice SEMS (self expanding metallic stent)
- m.c complication migration of stent
- $\bullet\,$ If stent is blocked Lasers can be used to relieve the blockade . Leiomyoma
- · m.c benign tumor of esophagus
- · On barium swallow Punched out / Semilunar defect
- management Enucleation



Esophageal diverticulae

00:38:45



- Diagnosis Barium swallow
- management if symptomatic or a large diverticulum

diverticulectomy





Zenker's diverticulum

00:43:59



- · Out pouches through killian's dehiscence space between thyropharyngeus and cricopharyngeus muscle.
- Pulsion diverticulum due to ↑ pressure
- Only mucosa is involved false
- · Starts in midline posteriorly but ends on left of midline.
- C/f seen in 4 -6th decade

Regurgitation of food - earliest symptom

Halitosis - foul odour

Aspiration pneumonitis -

In later stages - Dysphagia

intermittent dysphagia

System

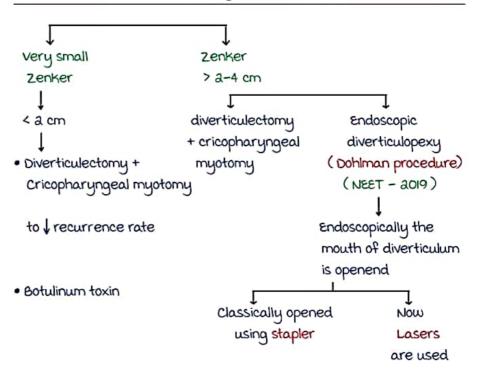
Complication m.c - Aspiration pneumonitis can lead to lung abscess

Diagnosis

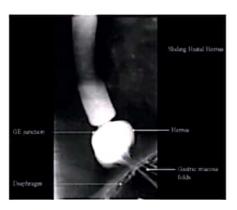
· Barium swallow.

Zenker's diverticulum - Management

00:48:42



Hiatal Hernia 00:53:26



- Hernia through the hiatus (opening in diaphragm) GEI lies intrabdominally
- m.c diaphragmatic hernia overall sliding hiatal bernia
- m.c congenital diaphragmatic Bochdalek / left posterolateral

- The GE junction lies in the thoracic cavity
- C/f Usually asymptomatic GERD
- 1.0.C Traditionally Barium meal
 CT with oral contrast (preferred)
- Management only Symptomatic patients

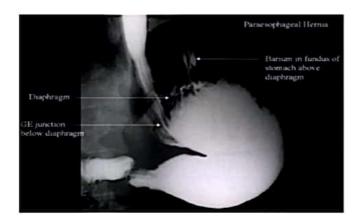
require surgery

fundoplication

(restores adequate length of intra abdominal length, hernia, GERD)

Rolling or Paraesophageal Hernia or Type - II

01:00:03



- A portion of stomach migrates through hiatal opening into thoracic cavity, but GEJ is normal.
- The herniated stomach can undergo volvulus and necrosis

hence, life threatening condition

There can be longitudinal ulcers - just below the herniated stomach

known as cameron ulcers

management - All patients require surgery

Through abdominal route

reduce hernia q tighten diaphragmatic crura

to 1 recurrence

Active space

Type III hiatal hernia

- · mixed sliding + rolling
- management depends on rolling component

Types IV hiatal hernia

 Paraesophageal hernia – but content other than stomach herniates through.

OESOPHAGUS 3

Schatzki ring

00:00:11

- → Benign Condition.
- → Involves:
 - mucosal ring (mc)
 - Sub mucosal ring

Clinical features:

Intermittent dysphagia

Diagnosis: Barium swallow

'B' ring appearance.

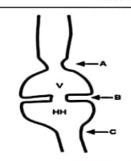


A ring → Proximal limit of vestibule.

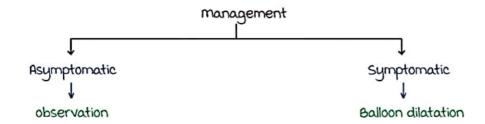
Bring → Schatzki's ring

at squamo columnar junction.

c ring -> Distal limit of hiatal hernia.

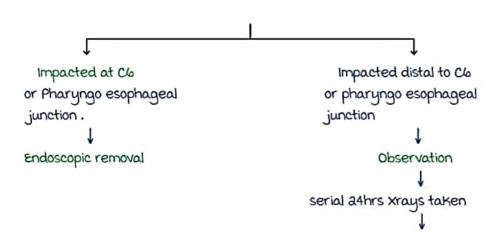


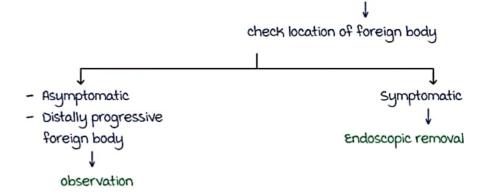




Foreign body ingestion

00:03:33



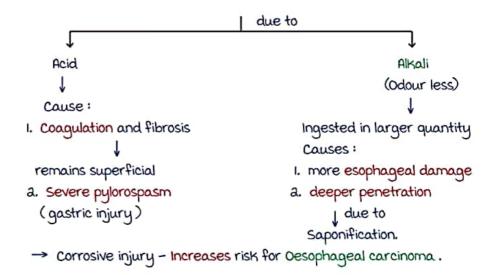


Button batteries

- → Can corrode and cause perforation.
- → Endoscopic removal should be done even if
 - 1. Asymptomatic patient.
 - a. Present distal to C6

Corrosive injury to oesophagus

00:07:24



management:

- 1. Stabilization IV fluids.
 - → Prophylactic antibiotics → no use
- a. Early skilled endoscopy
 - Check extent of damage
 - Plan further management.
- → Corrosive injury causes: strictures



IV antibiotics
 Analgesic.

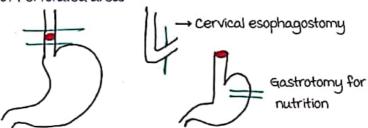
```
→ a/k/a Boerhaave syndrome
→ occurs due to
   forceful vomiting against closed glottis.
→ mc site - left posterolateral wall of lower 1/3rd of oesophagus
-> common in alcoholics
  Clinical features:
1. "mackler triad"
                                              Retching
→ Retching
-> Chest pain
→ Subcutaneous
                              Subcutaneous
                                                        chest pain
    emphysema
                               emphysema
a. Pneumo mediastinum.
  air from Oesophagus enters mediastinum.
 on auscultation: "Hamman Crunch"
                  'Crunching Sound'
IOC:
Stable patient
                                                   unstable patient
    CECT
                                                     Contrast study
                                                Iohexol
                                                           Dinosil
                                               medium / medium
Chest x ray findings:
→ Pneumomediastinum
   1. Continuous diaphragm sign
  a. Spinnaker Sign
  3. Ginkgo leaf Sign
management:
- Early presentation
                                         - Late presentation
  (within 1a hrs)
- minimal sepsis
                                         - Unstable patient
                                         - ↑ Sepsis.

    Stable patient
```

cervical oesophagostomy with gastrotomy.

Steps:

→ Removal of Perforated area.



- -> proximal end of Oesophagus in neck
 - cervical oesophagostomy
- -> Distal end of oesophagus closed
- -> Gastrostomy done (for nutrition)
- If patient survives.

Anastamosis done after 10 - 12 weeks.

 mc cause of mortality (40-50%) in Boerhaave syndrome is mediastinitis

Motility disorders

00:27:42

Achalasia cardia

- → occurs due to:
 - 1. Failure of relaxation of lower oesophageal sphincter.
 - a. Loss of ganglion cells (derived from neural crest)

In myenteric / Auerbach plexus. (lower half)

Loss of ganglion cells → Lower esophageal sphincter

does not relax.

Clinical features:

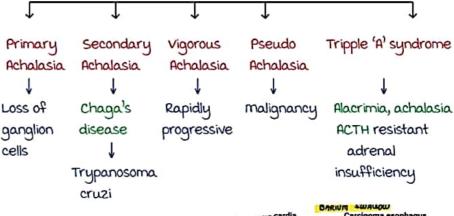
- 1. Regurgitation (earliest)
- a. Dysphagia

Initially: more to liquids > solids.

Later : Solids = Liquids

- 3. Halitosis.
- 4. Aspiration pneumonitis. (mc complication)
- 5. Lung abscess.

Active space



Diagnosis:
Barium Swallow
Bird's beak appearance
Gold standard: Manometry

GARDUR TAPERING

Carcinoma esophagus

Cancer

Cancer

Cancer

Cancer

Line

Concer

Cancer

Cancer

Cancer

Cancer

Cancer

Cancer

Cancer

Cancer

Findings: Chicago classification

- 1. Failure of Lower esophageal sphincter to relax.
- a. Ineffective contraction in body of Oesophagus.
- 3. Lower esophageal sphincter pressure ≥ 26 mm Hg.

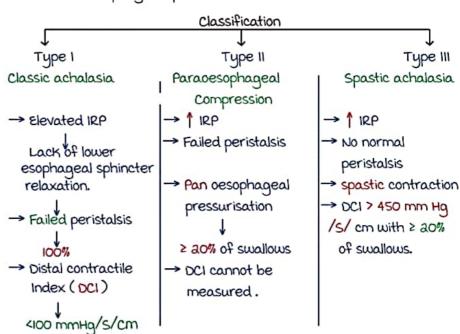
Latest Chicago classification

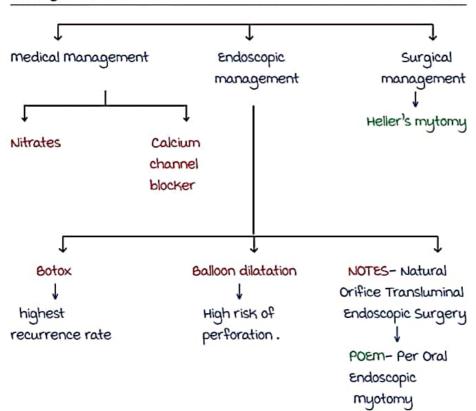
| based on

High resolution manometry

Integrated relaxation pressure (IRP)

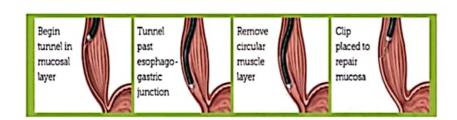
Definition: Mean of 4 Sec of maximal swallow induced lower esophageal spincter relaxation





POEM - Per oral endoscopic myotomy.





Procedure:

Endoscope inserted in the inner layer of Oesophagus.

Tunnel passed at esophagogastric junction.

Remove circular muscle

Lower esophageal sphincter relaxed

mucosa-sutured

Done for : type I/ classical achalasia

Laproscopic Heller's myotomy:

muscle incised at 5cm proximal and 2cm distal to GE junction.

Lower esophageal spincter relaxation.

mc Complication : GERD

Heller's surgery + Floppy Nissen fundoplication.

→ Achalasia causes ↑ risk of Squamous cell carcinoma of oesophagus.

Diffuse oesophageal spasm

00:45:35

- → New terminology: Distal esophageal spasm.
- → Clinical features:
 - 1. Chest pain similar to angina

Normal ECG

a. Dysphagia.

Investigations:

1. Barium swallow.

spasm of circular muscle

cork screw or

Rosary bead appreaance of Oesophagus.

- a. manometry.
- → ↑ duration > a.5 sec Contraction.
- → ↑ amplitude >120mm Hg

3. In high resolution manometry

- DCI >450 mm Hg /sq cm. (1 contraction)
- Integrated relaxation pressure Normal.

Lower esophageal sphincter is relaxed

management

Blockers

medical management Nitrates, calcium channel If patient does not respond

Cork screw appearance

myotomy

Nutcracker oesophagus

00:49:53

- → mc motility disorders.
- → Clinical features:
- 1. Dysphagia (mc)
- a. Chest pain

Investigation:

classical manometry:

- > 180 mm Hg pressure.
- Normal peristalsis
- Duration of contraction >7 sec.

Jack Hammer Oesophagus.

- → Variant of nutcracker Oesophagus.
- → new name : Hyper contractile Oesophagus.
- → On high resolution manometry
 - Distal Contractile Integral (DCI) > 8000 mm Hg/S/cm
- → on classical manometry pressure > 300 mm Hq

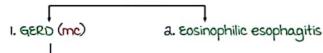
Feline oesophagus

00:52:28

→ Oesophageal mucosa appears

Stacked up

→ seen in



Lower 1/3rd of → idiopathic

→ Seen in children Oesophagus

→ Proximal 1/3rd of Oesophagus affected affected.

→ In eosinophilic esophagitis

Deep ulcers → strictures

Investigation:

Endoscopy: Stacked up mucosa

management:

- 1. Immunotherapy against 1L-5
- a. Steroids.

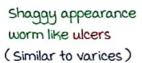




Oesophageal infections

00:55:39

- 1. Esophageal candidiasis
 - → Associated with oral thrush in immunocompromised patients.
 - → Investigation:
 - 1. Endoscopy: Shaqqy depositions on Oesophagus
 - a. Barium swallow: mucosal deposits

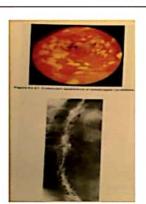


- a. Cytomegalo virus infection
 - → post transplant
 - → In graft versus host disease.
 - → Appearance: Serpinginous or geographical ulcers.
- 3. Herpes infection.
 - → Associated with Herpes labialis.
 - ightharpoonup Small ulcers, raised margins.

Dysphagia cusoria

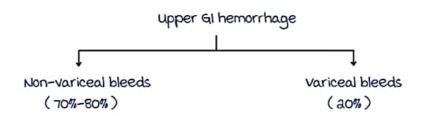
00:59:33

→ Due to aberrant right subclavian vein.



UPPER GI HEMORRHAGE

Hemorrhage above the ligament of trietz



Non variceal hemorrhage

00:01:20

most common cause : peptic ulcers
 (duodenal > gastric)
 vessel involved gastrodoudenal artery

a) and most common cause: gastritis

Type A Type B
(Autoimmune) (Bacteria

- (Autoimmune) (Bacterial)

 Autoantibodies against H. pylori
 parietal cells. antrum affected commonly
- Hypochlorhydria
 ↑ risk of cancer
- Pernicious anemia variant : pan gastritis
- Spares antrum
- Stress gastritis: Stomach or gastric mucosa is the most sensitive mucosa to hypovolemic insult
 - most common site of ischaemia in GIT is splenic flexure
 Stress gastritis



most common: Acid producing most carea of stomach

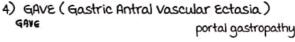
most common: D. duodenum

NSAID induced gastritis
 Gastritis in AIDS → Cryptosporidiosis

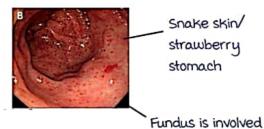
3) mallory weiss ear



- Longitudinal tear in mucosa (most common) and / or submucosa
- · Starts at gastroesophageal junction and proceeds to involve cardia
- · Vessel implicated : Left gastric artery
- Clinically, seen in alcoholics, after forceful vomiting.
- Investigation of choice: Endoscopy
- Usually self limiting
- management > Conservative
 If persistent bleed, angioembolization or cautery of bleed is done.







- Females > males
- Associated with autoimmune disorders, collagen vascular disorders, SLE or rheumatoid arthritis.
- Dilated submucosal venules in antrum.
- On Endoscopy: Watermelon stomach, fundus is Spared.
- management :

APC → Argon Photocoagulation

If recurrent / Severe → Antrectomy

5) menetrier's disease



- Hypertrophy of gastric mucosal folds
- ullet mediated by TGF lpha
- Earliest clinical feature, protein losing enteropathy
 Other features are upper & bleed
- 1 risk of cancer
- Investigation endoscopy
- management : Cetuximab
 if severe then total gastrectomy

6) Dieulafoy lesions

- · Dilated submucosal arterioles
- males > Females
- Similar to angiodysplasias in colon.
- mostly seen in elderly
- Clinically presents with upper GI bleed
- management : Coagulate the vessel

7) Tumors

Variceal hemorrhage: portal hypertension

00:19:33

```
    Hepatic Venous Pressure Gradient (HVPG)

      HVPG = Wedge Hepatic
                                                Free hepatic
               Venous Pressure
                                                Venous Pressure
               (inflated balloon)
                                                (deflated balloon)
                ≥ 10 mm Hg → Portal HTN
               ≥ 12 mm Hq → varices start to bleed
· Causes of portal hypertension
extra hepatic
                                         Intra hepatic
1. Portal vein Pre-Sinusoidal
                                    Sinusoidal
                                                      Post Sinusoidal
  thrombosis
                                   - Cirrhosis
                - Sarcoidosis
                                                   - Severe tricuspid
a. Splenic Vein - Schistosomiasis - Alcoholism
                                                     regurgitation
  thrombosis
                - Non - Cirrhotic - Viral

    Constrictive

                                  - Cryptogenic
                  Portal fibrosis
                                                      Pericarditis
3. Tumors
                                   - \alpha_i - Antitrypsin -IVC obstruction
4. Trauma
                                    deficiency
                                                     - Budd-Chiari
                                   - Wilson's disease Syndrome
```

- Portal Vein thrombosis (extra hepatic portal venous obstruction)
 - commonly seen in 1st and decade
 - Cavernous change is seen in portal vein / web



- Splenic vein thrombosis
 - Left sided portal hypertension
 - Usually secondary to Acute pancreatitis
 - management : Splenectomy
- Non cirrhotic portal fibrosis (NCPF)
 - 3rd 4th decade
 - No cirrhosis → no bridging fibrosis
 - Diagnosis of exclusion
 - Splenomegaly
 - Management : Transplant
- Budd chiari Syndrome
 - It is hepatic venous outflow occlusion
 - Causes of occlusion

↑

Prothrombotic state

Web in outflow vessels

- Pregnancy
- Protein C, S deficiency
- Typically seen in young females.
- Gradual course : Abdominal pain
 Clinically Portal hypertension
 Fulminant course : Fulminant liver failure
- Imaging, CECT
- management

Liver failure → Transplant

Identify and treat the cause

Lifelong anticoagulation

- · Clinical features of portal hypertension
 - Splenomegaly
 - Ascites
 - Liver failure
 - Porto systemic Shunts lower part of oesopqaqus bare area
 - of liver,
 - Umbilicus → Caput medusae
 - retroperitoneum
 - rectum





Caput medusae

 Investigation of Choice: Doppler Diagnosis is made by: HVPG

Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with Marrow Edition 4 videos.

Management of variceal hemorrhage

00:36:50

· Baveno classification

Small: Minimally elevated varices above the esophageal mucosal surface

medium: Tortuous varices occupying less than 1/3rd of the esophageal surface

Large: Varices that occupy more than 1/3rd of the esophageal





management:

- manage Airway
 Breathing
 Circulation
- Insert a large bore IV lines and give IV fluids
- Give IV agents (Best): IV terlipressin more commonly used: IV Octreotide not used → IV Propranolol
- IV PPI (Proton pump inhibitor) have no role in controlling hemorrhage before endoscopy

- sodium tetradecyl sulphate Others:
- Sodium morrhuate
- Polidocanol
- Ethanolamine oleate

Complications :

- Increased risk of perforation
- Chest pain

Outcomes:

Outcome

Bleeding Stops

- · monitor for a4h
- · If no re-bleed

Discharge

Oral Propranolol (Prophylaxis to reduce incidences of bleeding)

Rebleeds

· and trial of endoscopic

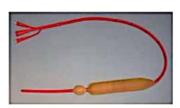
management

Prepare for TIPSS

Fails

- 1. Correct coaquiation profile
- a. Tube is used to temporarily to control bleeding

Sengstaken Blakemore tube



It has 3 channels

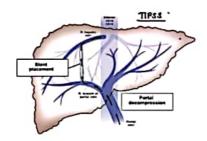
- esophageal balloon channel
- qastric balloon channel
- gastric aspiration channel
- First gastric balloon is inflated (300ml air)
- if bleeding does not stop then inflate oesophageal balloon (40 mmHq)
- Oesophageal balloon is deflated every 12 hours to prevent necrosis.
- minnesota tube : modification of above tube with I extra channel - oesophageal aspiration

TIPSS

- Transjugular intrahepatic portosystemic shunt
- Stent is placed between a hepatic vein branch and a portal vein branch

Decompression of portal system

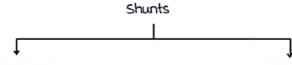
Reduce portal pressure and control bleeding



- Used: Variceal hemorrhage Intractable ascites
- · Contraindications : Portal Vein Thrombosis
- It is a non-selective shunt
 most common early complication hepatic encephalopathy/confusion.
 most common long term complication blockade of stent

Re - bleed

Shunt



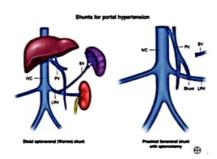
Selective

Non - Selective

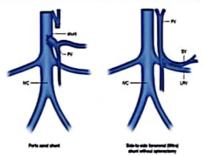
Only splenic blood is shunted

Splenic + gut blood is shunted Hepatic encephalopathy (toxins in gut blood precipitate in the brain)

- Shunt surgeries
 - Indications : Child Pugh category 'A' where recurrent bleeding ⊕
 - Warren Shunt : Distal splenorenal shunt (selective shunt)
 - Linton shunt : Proximal splenorenal shunt(Non-selective shunt)



- End to side portocaval shunt : ECK Fistula (Non selective shunt)
- Side to side splenorenal shunt : mitra's shunt(Non selective shunt)



- Left gastric venocaval shunt: Inokuchi shunt (Selective shunt)
- If bleeding is still not controlled esophageal devascularization -> Sigiura procedure

devascularize lower 6 cm of oesophagus

Prognosis of upper GI haemorrhage

01:01:03

Prognostic scores

- 1. BLEED criteria
 - 8 Ongoing Bleeding
 - L Low systolic BP
 - Elevated prothrombin time
 - 3 Erratic mental status
 - Comorbid Disease requiring ICU admission D

a. Forrest Classification

- Endoscopic classification which tells risk of re-bleeding

Risk	Class	Description
High	Acute hemorrhage Class I _a Class I _b	Spurting hemorrhage Oozing hemorrhage
Intermediate	Signs of recent hemorrhage Class II ₂ Class II ₃	Non - bleeding visible vessel adherent clot
Low	Class II _e Lesions without active bleed Class III	Flat pigmented spot Clean ulcer base

3. Rockall Score

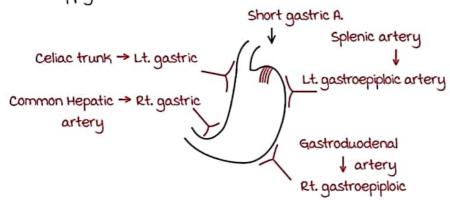
variable	Score = 0	Score = I	Score = a	Score = 3
Clinical Parameters				
Age Comorbidity	< 60	60 - 79	> 80 Congestive heart failure, ischaemic heart	Renal Failure, meta- static
Shock	No Shock	Pulse > 100/m	disease Systolic BP <	disease
Endoscopic Parameters				
Source of bleeding	mallory - Weiss tear	All other causes	malignancy	
Stigmata of recent bleed	None		Adherent clot or vessel	

- 4. Glasgow Blatchford scoring system
 - · pre endoscopic assessment
- 5. Alms 65 score

STOMACH - 1

Surgical Anatomy:

Blood supply of the stomach:



- Short gastric artery lies in the Gastrosplenic ligament.
- Left gastric artery is the dominant artery of the stomach.
 - artery that bleeds in the mallory weiss tear
 - artery that bleeds in Type 4 Gastric Ulcer
- stomach doesn't undergo necrosis even after ligating a vessels because of extensive submucosal anastomosis between the vessels

Idiopathic hypertrophic pyloric stenosis

00:04:51

Active space

- · Also known as Congenital hypertrophic pyloric stenosis. (CHPS)
- · m>F(4:1)
- First born male child of the family more common.
- · Associated with maternal Erythromycin intake during pregnancy.

Pathogenesis:

Hypertrophic pyloric muscle

Functional gastric outlet obstruction.

Clinical features:

- Pt . is normal at birth (In duodenal atresia : bilious vomiting since birth)
- Symptoms start after 2 3 weeks.
- Symptoms: Projectile vomiting

Non Bilious Vomiting

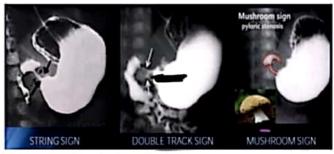
- · No Protein energy malnutrition.
- Diagnosis: USG Abdomen



- Hypertrophied pylorus
- Thickness :> 4 mm
- . Length of the pyloric channel : > 16 mm
- On x-ray abdomen:
 - Single bubble sign
- · On contrast study:
 - String sign
 - · Double track sign
 - mushroom sign

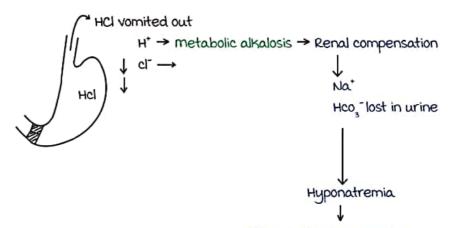


Single bubble



- On USG: Target sign, Antral Nipple sign.
- Because of gastric outlet obstruction, typical metabolic abnormalities are seen.

Hypochloremic hypokalemic metabolic alkalosis paradoxical aciduria due to gastric outlet obstruction



RAAS → Aldosterone actively reabsorbs Na* in the collecting duct

- First K⁺ excreted in urine → Hypokalemia.
- Later it starts excreting H^* ions in the urine leading to Paradoxical Aciduria. Its paradoxical, because body is already deficient in H^* ions; still eliminates H^* ions.

Examination:

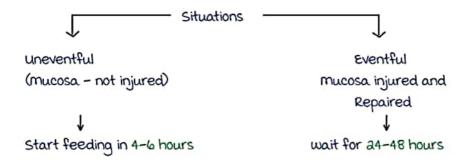
- · Best time to examine: when the child is feeding
- · visible peristalsis from Lt to Rt.
- · Palpable olive shaped swelling in epigastrium
- Projectile vomiting

management:

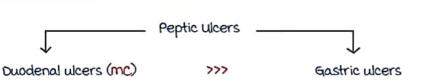
- · Correct dehydration and metabolic abnormality first.
- Best fluid
 O.45 NS + Dextrose ± Kcl: if not > RL

 RL
- Kcl is only added when renal function recovers and urine output is adequate.

Surgery: Ramstedt pyloromyotomy - Mucosa is Intact in this surgery



Peptic Ulcers 00:23:12



- · MC site of peptic ulcer: D, (first part of Duodenum)
- >90% associated with H. Pylori.

System

 Associated With acid hypersecretion. Therefore Duodenal ulcers respond to acid reducing surgery or vagotomy or PPI

Clinical features of duodenal ulcers:

- Epigastric Pain
- Silent Presentation or
- Presents with complications

Complications of duodenal ulcers:

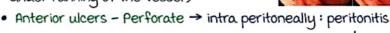
- mc complication : Bleeding
- Peptic ulcers are the most common cause of upper G.1 Hemorrhage.
- Posterior ulcers Bleed Vessel implicated: Gastroduodenal artery (GDA) [m.c vessel in bleeding peptic ulcer]
- mc vessel implicated in bleeding peptic ulcer: GDA.
- Diagnosis : Endoscopy

management:

 Atleast a attempts of endoscopic mx Needs to be tried.

Fails Surgery

(duodenotomy and under running of the vessel)





- Guarding
- Board like rigidity
- Rebound tenderness
- Diagnosis X-ray chest (Erect X-ray preferred)

Gas under the diaphragm (Sign of hollow viscus perforation)

If pt. is too sick and can't stand up

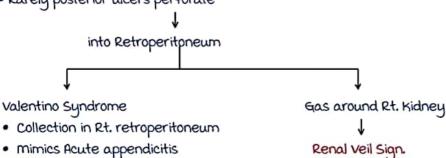
Lateral Decubitus position

Best inv. To detect free air: CECT (done only in stable pt.)

management: Laparotomy

Graham's patch repair (Omental patch repair)





Gastric Ulcers 00:37:50

- 60 -70% are associated with H.pylori.
- · All gastric ulcers should be biopsied to rule out cancer.
- Diagnosis: Upper G.I. Endoscopy.

"u" manuever should be done to see fundal gastric ulcer.

- Classification of Gastric ulcers: Johnson's classification.
 - Type I: Ulcer along the lesser curvature close to the incisura mc type of gastric ulcer (not peptic ulcer)
 - Type II: Ulcer in the Prepyloric region + ulcer in the Duodenum
 - · Type III : Only Prepyloric Ulcer.
 - . Type IV: High up in the body along the lesser curvature.
 - Type V: Diffuse ulcers due to NSAIDS.

119 111: Due to Acid hypersecretion - Responds to Vagotomy / PPI's.

· MC Gastric ulcer to bleed : Type IV.

Clinical features:

- · Pain
- Silent presentation
- Dyspepsia
- Complications → Perforation >> Bleeding

Peritonitis Endoscopic management

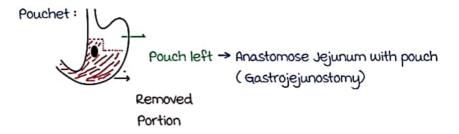
Fails twice

Laparotomy Surgery

Definitive Surgery for Gastric Ulcers:

- Type 1: Distal Gastrectomy
- 11, 111 : Distal Gastrectomy + Vagotomy/ PPI.
- · IV : Pouchet, Csendes procedures

Active space



H. Pylori 00:49:17

- CaqA, Vac A: Genes encode for toxin.
- Urease enzyme: Survive in the acidic environment.
- H.pylori can cause: Peptic ulcers

Type 8 gastritis Gastric cancer

MALTOMAS

H. Pylori is Slightly protective against adeno ca. esophagus.

Gastric reconstruction surgeries

00:51:53

1. Billroth 1:

- Distal Gastrectomy + End to End Gastroduodenal anastomosis.
- If tension present → Leak can occur.

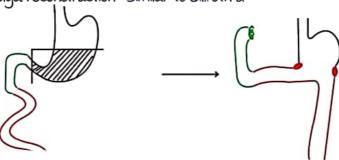


Distal gastrectomy

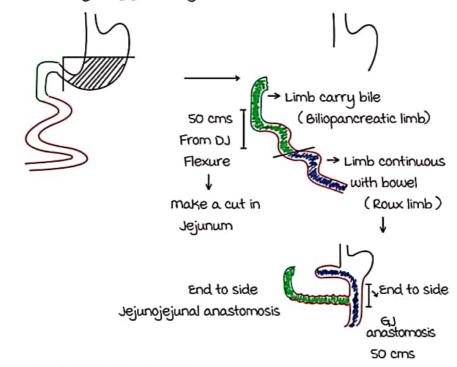
End to End gastroduodenal anastomosis.

a. Billroth a Reconstruction:

Polya reconstruction: Similar to Billroth a



end to side gastrojejunal anastomosis



- Gastrojejunostomy can either be Ante colic
- Jejunum is brought of infront of Colon.
- Hernia behind Roux limb K/a Peterson's hernia

Retrocolic

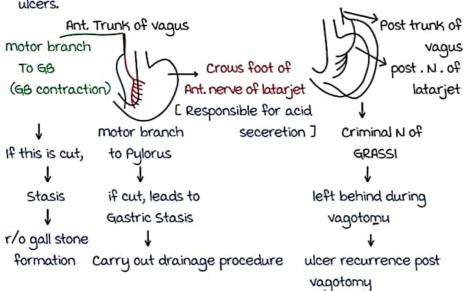
· Behind the colon

 Hernia in the transverse mesocolon window K/a Stemmer's hernia.

Vagotomy

01:07:42

 Acid reducing surgery done in duodenal ulcers, type 3 and 4 gastric ulcers.

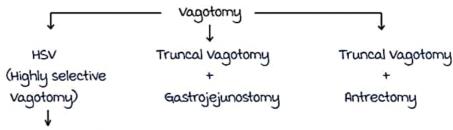


Carry out drainage procedure

Heinke mickulicz pyloroplasty

Gastrojejunostomy

Types of Vagotomy:



Cut the crow's foot branches But stop 7 cm from pylorus

Acid Reduction: Minimum maximum

Ulcer Recurrence a-10%

rate: (Highest) < 1%

Vagotomy

complications: LEAST maximum

HSV done in chronic ulcers

recurrent ulcers.

Since the development of PPI's, Vagotomies are not being done

Complications following Gastric reconstruction and vagotomy:

- Hemorrhage during Surgery
- · Anastomatic leak.
- Duodenal Stump blow out On Day 4

- Abdominal pain + Peritonitis

- · Internal Hernias Stemmer's and Peterson's.
- Ulcers at the anastomotic site or just distal to it.
- · Bilious vomiting.
- Afferent loop Syndrome Stasis in Biliopancreatic limb
- Post vagotomy diarrhea osmotic diarrhea
 - Octreotide is not useful.
- Nutritional complications IDA Iron Deficiency Anemia MC complication overall.

- Dumping Syndrome:
 Early dumping
 - Occurs due to rapid influx of Fluid due to Hyperosmolar
- Late dumping
- Occurs due to Rebound Hypoglycemia. Seen due to

contents in the bowel.

- Starts within 10mins of Consumption of meals.
- C/F: Epigastric fullness
 Bloating
 Nausea & Vomiting
- Worsens with consumption of more food
- · Duration of attack for both: 30-40 mins

excessive insulin release.

- Starts after 45mins to 1 hour
- C/F: of Hypoglycemia: headache, Sweating, tachycardia dizziness.
- · Worsens with excercise .

Dietary changes in Dumping Syndrome:

- Small frequent meals
- Avoid Sugar rich meals
- Avoid liquids with meals
- Avoid sugar rich liquids
- Avoid simple sugars
- High Protein diet
- If Symptoms Still persists ----- OCTREOTIDE is helpful.

Symptoms persist even after octreotide

Convert to Roux- en -Y Gastrojejunostomy.

ACIIVE Space

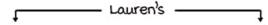
STOMACH -2

GASTRIC CANCER

Risk factors:

- Smoking
- Alcohol Consumption
- · Consumption of smoked food or fish
- · Preservative rich food.
- · H. pylori
- Gastric resections and reconstructions.
- menetriers disease
- polyps: Adenomatous polyps / True adenomas
 - · Associated with Familial Adenomatous Polyposis syndrome.
 - mc polyps: metaplastic polyps associated with H. Pylori
 - These metaplastic polyps DO NOT increase the risk.
- · Gastritis Type A and B.
- . TYPE A Blood group.
- Since the advent of refrigeration, incidence of gastric cancer has gone down.
 - Site for gastric cancer:
- · mc site in western world: proximal stomach.
- mc site in Asia and over all: Antrum.

LAUREN'S CLASSIFICATION OF GASTRIC CANCER:



Intestinal

- Due to Environmental factors
- · men > women
- Increasing incidence with age
- microsatellite instability

Diffuse

- · Due to familial factors
- · women > men
- · younger age group
- poorly differentiated signet ring cells
- Decreased € cadherin
- Early gastric cancer: japanese classification. Above the muscle layer
- Advanced gastric cancer: Bormann classification .- invades the muscle layer.
- . Type 1 polypoidal type of Early Gastric cancer Best prognosis.
- Type IV Diffusely infiltrative type of Advanced Gastric cancer -Worst prognosis
 (Linitis Plastica)

molecular classification of Gastric cancer:

- EBV related: PD -L 1/a overexpression: immunotherapy is useful
- microsatellite instability: Hypermutation mLH - 1 silencing
- Chromosomal instability: TP53 mutation, RAS activation
- Genetically stable type: Diffuse histology → worst prognosis. CDH - I mutation

Clinical features of Gastric cancers:

- L Lump
- O Gastric outlet obstruction (GOO)
- A Anemia, Anorexia
- D Dyspepsia (New onset)
- S silent presentation.
- mcc of GOO now -a-days: Gastric cancers.
- Weight loss is a major Symptom in Gastric cancers

Atypical presentations of gastric cancers

00:14:02

- 1. Sister mary joseph's nodule:
 - Periumbilical metastasis which is seen in Gastric (mc) and ovarian cancers.
- a. Krukenberg tumor
 - B/L ovarian metastasis
 - mc cancer which gives rise to Krukenberg's tumor: Gastric cancer Breast, colorectal cancers.

Old theory: Transcoelomic spread /drop mets.

: Retrograde lymphatic spread.

- 3. Irish nodule: Left axillary lymphadenopathy
- 4. Virchow's Lymphnode / Troisier's sign: left supraclavicular lymphnode.
 - sign of Advanced disease in any G.1 / G.u malignancy.
- 5. Blumer's Shelf nodules:
 - Pelvic metastasis into pouch of Douglas/Retrovesical pouch in males
 - Sign of advanced disease in any G.1 cancer.
 - Felt on Digital Rectal Examination.
- 6. Migratory thrombophlebitis: Trosseau syndrome
 - mc seen in pancreatic cancer.
 - typical of Glucagonoma.



- multiple seborrheic Keratosis in internal cancers.
- Resolves after Gastrectomy

Tripe palms



- Hyper Keratotic palms
- · Sign of internal malignancy

Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with marrow Edition 4 videos.

Diagnosis of Gastric cancers:

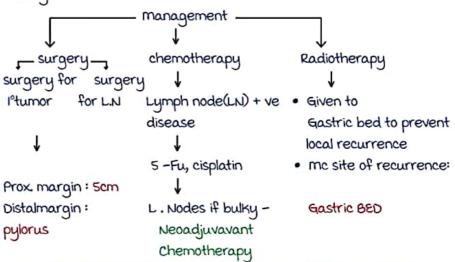
- · Endoscopic Biopsy
- over all staging: PET CT (18 FDG: +1/2 -110mins)
- · TEN staging : EUS

Primary	tumour (T)	Ti	T
TX	Primary tumour cannot be assessed	T3	Tumour penetrates the subserosal connective tissue without
το	No evidence of primary tumour		invasion of the visceral peritoneum or adjacent structures
Tis	Carcinoma in situ: intraepithelial tumour without invasion of the lamina propria	T4	Tumour invades the serosa (visceral peritoneum) or adjacent
Tla	Tumour invades the lamina propria or the muscularis mucosae		structures ^b
ТІЬ	Tumour invades the submucosa	T4a	Tumour invades the serosa (visceral peritoneum)
T2 Tumour invades the muscularis propria			
			Tumour invades adjacent structures ^b

NI	Metastasis in 1-2 regional
	lymph nodes
N2	Metastasis in 3-6 regional
	lymph nodes
N3	Metastasis in 7 or more
	regional lymph nodes
N3a	Metastasis in 7-15 regional
	lymph nodes
N3b	Metastasis in 16 or more
	regional lymph nodes

System

mc site of Distant metastasis of Gastric cancer: LIVER. management:

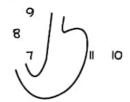


- For a prepyloric tumor: Distal Gastrectomy (30%) of stomach is removed.
- Tumor in body of stomach: subtotal / partial gastrectomy -60-70% Stomach is removed.
- Tumor in the fundus: Total gastrectomy with esophagojejunal anastomosis



Surgery for the Lymphnodes:

- Japanese divided L.N's into various stations
 - 1: Rt. para cardiac
 - a: Lt. para cardiac
 - 3: Lesser curvature
 - 4 : Greater curvature
 - 5: supra pyloric
 - 6: infra pyloric
- if we remove 1-6 stations: D, gastrectomy / LN clearance.
- 1-6: Around the stomach



8: common Hepatic vessels .

9: celiac axis

10: Hilum of spleen

11: splenic Artery.

if we remove 1 - 11 stations: D_a Gastrectomy/clearance

Optimal L.N clearance

minimum no. of L.N Removed: 15

One-liners for gastric cancer

00:37:00

- most important prognostic factor:
 over all:T -stage / Depth
- most important prognostic factor in operable cancer: L.N status
- · mc site of distant mets: Liver
- If there is PDLI gene mutation: Pembrolizumab
 - Approved for metastatic /recurrent gastric cancers.
- HER a Neu mutation: Trastuzumab/Herceptin
- Oral fluoropyrimidine derivative: Tegafur; it is combined with enzyme inhibitors K/a Oteracil and Gimaracil. if these three drugs are combined it is known as s, chemotherapy - its an ORAL Chemotherapy for advanced Gastric cancer.

Gastro intestinal stromal tumors (GIST)

00:40:42

- Arise from the intestinal pacemaker cells of kajal.
- mc site for GIST: stomach.

Sporadic

>>

Familial

- Carney's triad
- its known as Carney stratakis Syndrome

- Gastric GIST
- · composed of Gastric GIST and
- ParaganglionomasPulmonary chondromas
- No pulmonary chondromas
- Gastric GIST in Carney's triad are usually SDH gene mutated.

1º Resistant to Imatinib

- Gastric GIST are multifocal and Aggresive.
- GIST behave like sarcomas. They don't metastasize to L.N'S

ive space

- System
- Lymh node clearance is not required
- Hematogenous spread is common. MC site distant to metastasize: Liver.

Clinical features:

- mc: upper G.1 Hemorrhage.
- mass
- · Pain
- Perforation
- GIST is a Radiological Diagnosis. Biopsy is NOT mandatory.
- IOC : CECT
- Monitoring therapy in metastatic GIST: PET-CT is used.

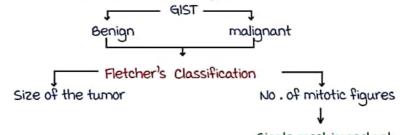
management:

mainstay: surgery - Resect the tumor in acm margin

- If present in stomach wedge resection with acm margin.
- LN clearance NOT Required.
- If tumor is adherent to another structure → Resect the other structure too
- If malignant /metastatic GIST → Imatinib
- If Imatinib Resistant → Sunitinib or Sorafenib

Pathology of GIST:

On HPE: Epitheloid or spindle type.



>10

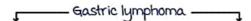
Malignancy risk Size (Cm) Mitotic (50 hmf) . Low 4 . Intermediate 6-10 6 5-10 · High >5 >5 >10 Any index

Any size

Note: 50 hmf = 50 high magnification fields (400x) Source: Fletcher et al., 2002.

Single most important prognostic factor.

- Immunohistochemistry :
 - · CD 117 / c KIT mc IHC marker in > 90 % GIST
 - CD 34 present in 65-70 % of GIST.
 - DOG 1 most specific marker for GIST.
 - · wild type of GIST c- KIT -ve



1º Gastric lymphoma

44

stomach can be involved as a secondary site as a part of Diffuse lymphomatous process.

1º Gastric lymphoma:

- It is NHL B cell lymphoma.
- it is a Diffuse large B-cell lymphoma (DLBCL)
- Stomach is the MC extranodal site in GIT to be involved with lymphomas.

clinical features:

- Lump
- · upper G.I. Hemorrhage
- · B symptoms of lymphoma

Diagnosis: Endoscopic Biopsy

R - Rituximab (cDao)

C - cyclophosphomide

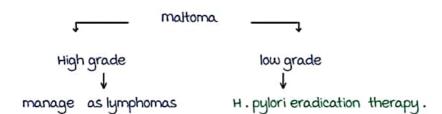
H - Hydroxydaunorubicin

o - Oncovin / vincristine

p - prednisolone

MALToma 00:57:0

- mucosal associated Lymphoid Tissue tumor.
- mc' ly seen in stomach, associated with H. pylori



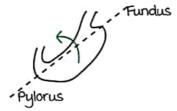
Active space

Gastric volvulus

00:59:00

organo-axial

mesentero-axial



lesser curvature Greater curvature

- mc type overall.
- Associated with Diaphragmatic defects
- Rolling / paraesophageal hiatal hernias
 usually not associated with
- Acute presentation
- Complete vascular compromise

- mc In children
- Associated with wandering spleen
- Diaphragmatic defects
- chronic presentation
- Incomplete volvulus -vascular compromise is uncommon

Clinical features:

- Borchardt's triad : upper abdominal pain.
 - Retching
 - Inability to insert Ryles tube

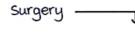
IOC : CECT

in contrast study : Cascade sign.

management: surgery



If stomach necrosed



Resect

Not necrosed Derotate

 Also correct Diaphragmatic defects if present.

qastropexy

Trichobezoar

01:05:35

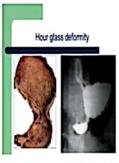
- · Hair ball inside the stomach.
- associated with psychiatric disorders.
- · mc in females > males.

Clinical features:

- · Present with Gastric outlet obstruction
- IOC : CECT
- mx: surgical Removal
- if duodenal extension is present, its known as Rapunzel syndrome.



· Gastric ulcers can give rise to two deformities







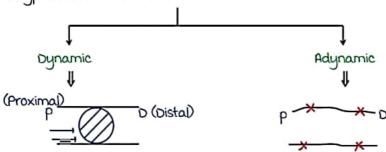
- · Hourglass deformity
- · Kissing ulcers

INTESTINAL OBSTRUCTION - 1

Intestinal obstruction - type, clinical features, investigation

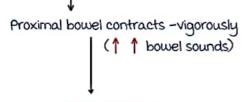
00:00:17

Type of intestinal obstruction



- Physical obstruction (feces) of bowel wall
- · Contraction of bowel -normal
- Dynamic obstruction

- No physical obstruction of the bowel wall
- No contraction / peristalsis
- Adynamic obstruction



 silent abdomen is a normal clinical sign

Silent abdomen

Cominous sign of perforation / strangulation]

- a. Clinical features
 - a. History of colicky abdominal pain
 - Abdominal distension
 - Vomiting
 - obstipation [non passage of feces / flatus]
 - b. Order of appearance of symptoms may vary according to the site of obstruction

Eq - incase of duodenal obstruction

- Vomiting → early feature
- Obstipation → late feature

Eg - incase of large bowel obstruction

- Vomiting → late feature
- Obstipation → early feature

3. Investigations

A. Initial Investigation -> X-ray abdomen



Erect



- Air fluid level > 3⇒ obstruction
- more distal the obstruction
 more the air fluid levels

supine



- To identify site of intestinal obstruction
- 1. Jejunum
- Step-ladder / concertina effect
- Feathery appearance
- Complete volvulus
- a. Ileum
- featureless loops of wangensteen
- 3. Large bowel



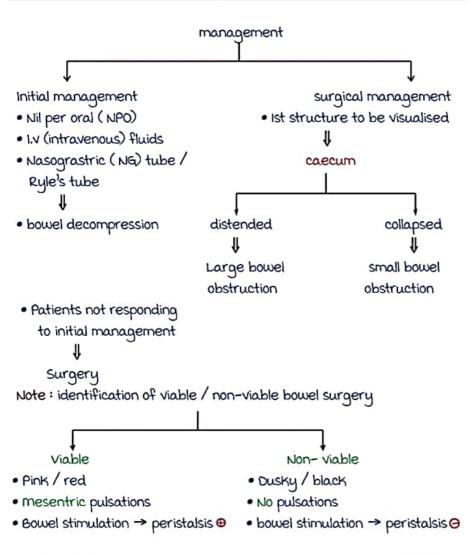
- Appears in the periphery
- Incomplete haustrations
 L Not extending from one wall to the other]
- b. Investigation of choice (10C)
 - Children → USG (ultrasound)
 - Adults → CE CT (contrast enhanced computed tomography)
- C. Finding of intestinal ischaemia on CT
 - Reduced bowel wall enhancement

[11 times higher chance of ischaemic bowel] - Absence of mesentric fluid

[Reduces chance of ischaemic bowel by 6 times]

Intestinal obstruction - management

00:12:04



Duodenal atresia

00:15:56

- · most common cause of bowel obstruction in neonates
- Commonly associated with Down's syndrome
- Clinical features
 - D mother polyhydramnios
 child Bilious projectile vomiting
 since birth

(Differentiate from congenital hypertrophic pyloric stenosis)



Active spa

- 00
- Investigations
 - Notical investigation
 X-ray → Double bubble sign
 - (also seen in annular pancreas)

i) CT

- Definite diagnosis
- · Types of duodenal atresia

Type 11 → i) short fibrous band ii) muscle layer - intact

Type III → i) complete obstruction
ii) No continuation

management of duodenal atresia.

Surgery

Duodenoduodenostomy >> Duodenojejunostomy

Intussusception

00:20:12

Definition

Telescoping of 1 Bowel into the other Proximal bowel telescopes into distal bowel

Parts

- Intussusceptum → bowel that telescope inside
- Intussusscepiens → bowel that receives the other
- Narrowest part → neck of intussusception
- apex of intussusception → 1st part to undergo ischaemia

Types of intussusception



- · Occurs in children
- 5-10 month (till a years)
- Preceded by URTI (upper respiratory tract infection)
- occurs a^o to pathological lead point
- most common lead point overall → polyp
- · other lead points
- meckel's diverticulum

- Cause → hypertrophy of peyer's patches
- cancercarcinoid

- Nature of intussusception
- · most common in adults
- ileocolic (most common)
- Nature of intussusception

colo-colic

- Primary is more common than secondary
 - : lleocolic is more common than colo-colic

History

- child experiences spells when he/she cries \(\frac{1}{2} \) raises the leg
- · Red current jelly stools (Blood mixed with mucus)

On Examination

sausage shaped lump

- Empty right iliac fossa (RIF)
- Sausage shaped lump in right lumbar region





Intussusception → sometimes felt on digital rectal examination
 E Rectal prolapse → no gap between rectal wall and prolapse intussusception → gap between rectal wall f intussusception

Investigations of intussusception

- initial investigation → x-ray erect, spine (same for all intestinal obstruction)
- · 10C → children- USG, Adults- CECT

usg-



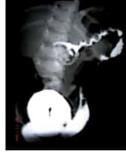
Target / Dough nut / pseudo - kidney sign - presence of mesentric vessels within the bowel lumen

- · contrast enema
 - Only with gastrograffin
 - claw / pincer sign

management of intussusception

1. Contrast enema

- Both diagnostic & therapeutic
- Children: 60-70% reductions can be achieved

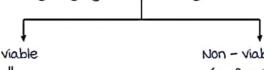


a. Surgery

Indications for surgery / contraindication for contrast

- (i) Recurrent intussusception
- (ii) To tackle pathological lead point
- (iii) perforation of bowel
- (iv) strangulation of bowel

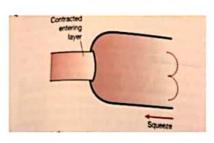
During surgery - Bowel management



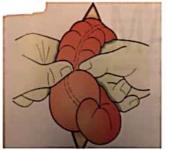
- Squeeze from most distal part

- most difficult part to reduce → last part Resection & Anastomosis





squeeze from most distal part



squeeze the intussusception

Retrograde intussusception:

- Distal bowel telescopes into proximal bowel
- · Rare
- Seen in patients with Roux-en-y gastrojejunostomy

[(Distal) jejunum goes into biliary limb [proximal]

Volvulus - Sigmoid volvulus

00:35:55

1. Sigmoid volvulus

- most common volvulus in GIT
- usually rotates anti clockwise

Predisposing factors for sigmoid volvulus

- Long & narrow mesentery
- Redundant sigmoid



- Loaded (constipated) sigmoid

Common in patients with

- Antipsychotic medications
- Hypothyroid patients
- institutionalized patients

Clinical features of sigmoid volvulus

- vomiting (late sign)
- Obstipation
- marked distension

Investigation in sigmoid volvulus

Initial investigations → x-ray abdomen [erect \{ supine]

coffee bean sign / bent inner tube sign

Sigmoid volvulus \rightarrow Apex of the volvulus in right upper quadrant Cecal volvulus \rightarrow Apex of the volvulus in left upper quadrant

- · IOC →CECT
- Contrast enema → Bird's beak / ace of spade appearance

(Also seen in Achalasia cardia)

management of sigmoid volvulus



- · No features of peritonitis
- No sepsis
- a. Temporary Measure
 - Sigmoidoscopic decompression

Hartmann's procedure

peritonitis (+)sepsis (+)

i) Resection of perforated area

- Construction of colostomy (with proximal end of the resected area)
- Distal end-closed

Closure of peritoneal Cavity

ii) anastomosis of

Proximal 9 distal End → After 2-3 month Active spac

Caecal volvulus

- · Females > males
- Age: 4th-5th decade
- · mobile caecum
- · Rotates clock wise

Clinical features

(similar to bowel obstruction) - Vomiting
- Obstipation

Investigation:

- Initial investigation → x-ray abdomen [erect \(\) supine]
- · 10C → CECT

management



Right hemicolectomy

3. Compound volvulus

caecopexy

- Also Know as ilio-sigmoid Knotting
- · Cause long pelvic mesocolon

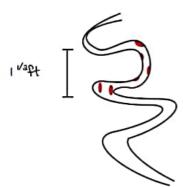
lleum rotates around sigmoid

Other causes of dynamic bowel obstruction

00:48:38

a. Strictures

Can be seen in – Tuberculosis – Crohn's disease patient-A (TB)



3 Stricture within 11/4 th

patient -B (crohn's)



3 strictures within 4ft of small intestine (evenly distributed)

management

Resection 9 anastomosis

management

stricturoplasty

[Heineke mickulicz stricturoplasty]

b. meconium Ileus

soap ← bubble appearance







microcolon

Neuhauser sign

- · seen more commonly in cystic fibrosis
- thick secretion → bowel obstruction
- In-utero aseptic peritonitis

Clinical features

- Non passage of meconium
- Distended bowel loop

Investigation:

1. Initial investigation

X-ray abdomen ⇒ • soap bubble appearance [Neuhauser sign]

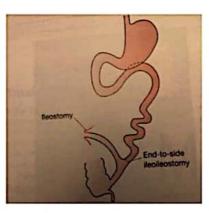
microcolon

System

a. sweat chloride test

management:

 Initial management → Gastrograffin enema **↓** Fails Bishop Koop surgery ⇒ Ileostomy End-to-side ileostomy



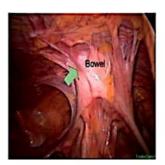
Bishop Koop surgery

INTESTINAL OBSTRUCTION - 2

- mc cause of bowel obstruction: Adhesions
- most adhesions are post surgical.

Non surgical causes of bowel adhesions:

- · TB
- Crohns
- Endometriosis
- · PID
- · Post radiotherapy



Clinical features: Same as cardinal features of bowel obstruction On Examination:

Scar over the abdomen

Initial investigation: x-ray abdomen erect and supine

loc : CECT

management:

- dynamic bowel obstruction- conservative management can be tried for 48 - 72 hours.
- · majority patients have spontaneous resolution of the condition
- Gastrograffin helps in resolution of adhesive intestinal obstruction.
- Last resort : Surgery Adhesiolysis.
- If recurrent adhesive obstruction present Noble plication
 Charles Obilions present

Charles Philippe procedure

Meckel's diverticulum

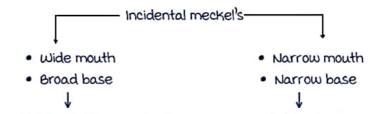
00:06:13

- Remnant of vitellointestinal duct.
- Situated in the antimesenteric border
- Independent blood Supply.
- True diverticulum it has all the layer of bowel.
- Rule of a: a% population a inches long
- · Situated a feet proximal to Iliocaecal junction
- a0% patients ectopic mucosa in the meckel's
- mc ectopic mucosa: gastric mucosa > pancreatic mucosa.



Presentations of meckel's:

1. Incidentally detected meckel's:



- a. meckel's diverticulitis:
 - · Inflamed meckel's diverticulum.
 - mimic acute appendicitis.

No intervention required

management: diverticulectomy

IOC : CECT.

- 3. Perforated meckel's:
 - Patient presents with peritonitis

management: resection and anastomosis of bowel.

- 4. meckel's in hernial sac:
 - · Littre's hernia
- 5. Bleeding meckel's:
 - mc Presentation in children
 - · Bleed is because of Ectopic gastric mucosa
 - C/F: lower gastrointestinal hemorrhage

10C: Tc 99 pertechnate Scan - most sensitive investigation

- Can detect bleeding of 0.1 ml / sec

Diverticulectomy.

management: Self limiting.

If persistent bleed → Embolisation.

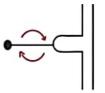
Definitive management: diverticuletomy.

- 6. Bowel Obstruction:
 - mc presentation in adults.

Obstruction of bowel by meckel's

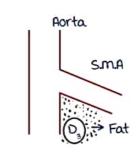
· Can act as a pathological lead point for intussusception - mc method A band from meckel's to umbilicus

Bowel can undergo volvulus around it



- Wilkie's / Cast Syndrome
- Compression of 3rd part of duodenum in between S.M.A and aorta (S.M.A - Superior mesentric artery)
- It is due to loss of angle between aorta

 § S.M.A due to loss of fat that
 maintains the angle.
- (n) Angle: 25 45°.



3rd part of duodenum

Predisposing Factors:

- · Rapid weight loss
- Spinal cast
- Anorexia nervosa
- If the angle is < ao aa° D3 gets compressed

Clinical features:

- · Bilious vomiting
- · H/O weight loss.

10c: cT - angiography

management:

- · Ask them to gain weight Nutrition support.
- Strong's procedure: Duodenal derotation procedure

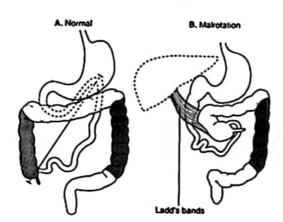
Cut the ligament of trietz

Procedure of choice: Duodenojejunostomy.

Ladd's Band

00:20:59

· mc intestinal malrotation abnormality.



Ladd's band runs from right Hypochondrium to caecum

Duodenum gets compressed by this band

Duodenal obstruction

management: Excision of ladd's band

Adynamic causes of bowel obstruction

00:23:33

- 1. Hirschsprung disease:
- A/K/A congenital megacolon.
- Absence of ganglion cells in both meissner's and auerbach's plexus

Functional Intestinal obstruction.

- Glial cell Derived Neurotrophic Factor (GDNF) is implicated.
- Common in . Down's Syndrome
 - · MEN aA > aB

Clinical features:

- mc Presentation: Non passage of meconium
- Abdominal distension.

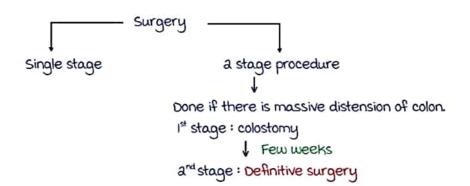
On Examination:

- On Digital rectal examination: Child passes meconium
- Diagnosis: Rectal biopsy Full thickness
 - Absence of ganglion cells
 - Hypertrophic nerve trunks
 - Immunohistochemistry : Acetylcholine esterase.
 - manometry can support diagnosis.
- Adults with Hirschsprung → Chronic constipation.
- Extent of the disease → Contrast enema.

Dilated bowel -> Normal Transitional Zone constricted bowel



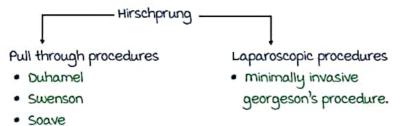
management:



Principles of definitive surgery:

- 1. Bypass the abnormal segment (or)
- a. Resect the abnormal segment.

Procedures:

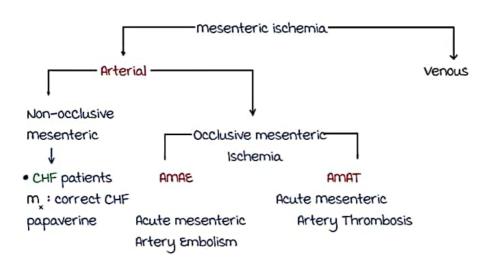


Best method to find out normal bowel: Intra operative frozen section from edge

Look for ganglion cells

Mesenteric ischemia

00:35:03



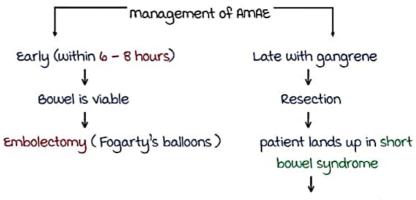
AMAE:

- mc type of mesenteric bowel ischemia
 - · Source of emboli : Heart
 - Common in patient with atrial fibrillation
 - mc vessel affected: Superior mesenteric

artery

middle colic artery

- · Clinical feature: Bowel attack
- Sudden abdominal pain
- Ends with peritonitis
- · IOC: CT Angiography



Superior mesenteric artery embolism is the mc cause of Short Bowel Syndrome - Overall.

Acute Mesenteric artery thrombosis

Secondary to atherosclerosis of superior mesenteric artery

Clinical features:

- · Bowel angina
- Postprandial abdominal pain starts 10-20 minutes after meals, persist till 1-a hrs.
- Weight loss

IOC: CT Angiography

management: Bypass grafting

Venous: mesenteric venous thrombosis

Secondary to virchow's triad.

IOC : CT Angiography

management: Anticoagulation

Papaverine

On imaging: Thumbprint sign



- · Depends on extent of surgery, bowel handing
 - Sepsis
 - metabolic factors Uraemia
 - Hypokalemia MC cause
 - · Hypothermia
- · mc Segment affected Ileum.
- Pacemaker of bowel situated at fundus of stomach.
- · Last to recover colon

management :- 1.V fluids

- Nil per oral
- Ryle's tube
- Correct metabolic abnormality
- · CECT to rule out other causes of obstruction.

Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with marrow Edition 4 videos.

Colonic pseudo-obstruction

00:52:09

· A/K/A Oglivie's Syndrome.

Causes:

- Patients with neurological conditions parkinson's disease, Alzhiemers
- Antipsychotic medications
- Retroperitoneal hematoma
- Spinal injury

On Examination:

- Features of large bowel obstruction.
- Caecum Distended or perforated.
 - -> 9cm Caecum Dangerous sign.
- · Small bowel normal with bowel sounds.

IOC: CECT - Done to rule out bowel obstruction.

management:

- Catchpole regimen Single shot of I.V Neostigmine.
- · Colonoscopic decompression.

SMALL AND LARGE BOWEL -**BENIGN CONDITIONS**

Ileostomy and colostomy

00:00:38



lleostomy	Colostomy
 Any portion can be chosen (entire ileum is mobile) Higher output (ileostomy flux) more fluid and electrolyte imbalance Output - Liquid in nature higher chances of skin excoriation (liquid irritates skin) Gross appearance - Pouts above the surface of skin (prevents liquid from contacting the skin) 	Transverse colostomy only Sigmoid colostomy mobile parts of colon Semi - solid / solid output Easier to handle Gross appearance - at the same level as that of skin



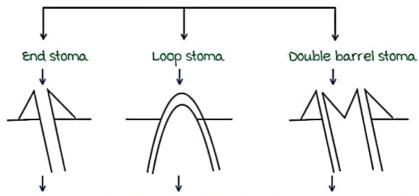
ILEOSTON 4





Types of stoma

00:04:42



- One end is taken out
 Entire loop taken out
 Two ends taken out
- After abdominal perineal resection
- After Hartmann procedure
- Placement of stoma Along outer border of rectus abdominus Away from bony land marks usually along the spinoumbilical line (Line joining the anterior superior iliac spine and umbilicus)

Complication of stoma

00:07:58

side by side

- 1) Earliest complication Necrosis of stoma
- a) Fluid and electrolyte imbalance
- 3) Skin excoriation m.c complication of ileostomy overall m.c early complication for colostomy
- 4) Stoma obstruction
- 5) Prolapse
- 6) Retraction
- 7) Para stomal herniation Another loop of bowel herniates from the side

m.c long term complication Loop colostomy > End colostomy

management - simple suture repair

100% recurrence

- mesh repair - preferred

Fecal fistula 00:12:18

32 Small and Leave Zog back Large Bowel -Benign Conditions



High output (> 500cc / 24 hrs) Low output (< 200cc / 24 hrs)

management:

- S Skin excoriation, sepsis control
- N Nutritional management (TPN)
- A Anatomical delineation (Imaging)
- P Planned surgery

Favourable factors:	unfavourable factors:
(Fistula undergo undergoes	(Fistula cannot undergo
closure)	spontaneous closure)
↓	↓
Site - • Esophageal, Duodenal	 Gastric, lateral duodenal
stump	 Jejunal fistula
 ileal, pancreatic fistula 	
Output - Low (< acocc / a4 hrs)	High (> 500 cc / a4 hrs)
Sepsis - absent	Present
Distal obstruction - absent	Present
Nutrition - Good	Poor
Defect -< Icm	> lcm
Length of tract ->1cm	< lem
3	 malignancy
	Radio therapy
	foreign body

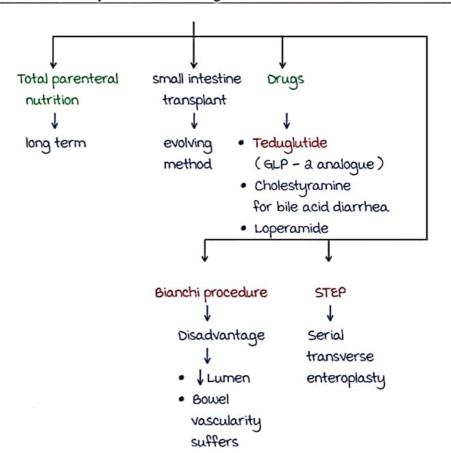
Short bowel syndrome

00:18:54

- < a00 cm of small intestine (SI) Short bowel syndrome causes 1) m.c - Superior mesentric artery embolism
- a) crohn's
- 3) Trauma
- C/F-malabsorption diarrhea weight loss Bacterial overgrowth If ileum is not present - 🗸 Vitamin Bla ↓ Bile salt absorption → diarrhea
- If large bowel + ileocecal junction is present absorption to some extent (+)
- If jejunum is removed ileum can adapt.

Short bowel syndrome - management

00:22:49



Bianchi surgery - procedure

- · Open the bowel
- · Split the bowel longitudinally into two
- · Roll each portion in the form of bowel and end to end anastomosis

Step procedure

 A linear stapler is fired along the mesenteric and anti – mesenteric borders alternatively

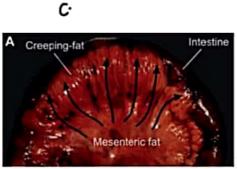
Inflammatory Bowel disease

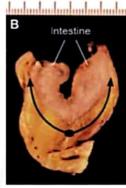
00:27:50

Crohn's disease	ulcerative colitis
 Incidence ↑ Peak - 20 - 40 yrs 2nd peak - 70 yrs Females > males Smoking ↑ ↑ risk Refined diet ↑ risk NOD2 / card 15 gene 	 a5 - 40 yrs males > Females Smoking is protective
 It can involve any portion of GIT from oral cavity to anal cavity m.c - terminal ileum Relative rectal sparing Anal involvement is common (Fissures / fistulae) 	 Involves colon - Rectum - M.c Ist - Proctitis pancolitis Back wash ileitis Anal involvement is uncommon

Inflammatory bowel disease - Gross differences

00:32:37





32 Small and Leave Zegdback Large Bowel -Benign Conditions

Active space

Crohn's disease	ulcerative colitis
 Creeping fat sign Transmural inflammation (All the layers of bowel are 	• Only mucosa f submucosa is involved
involved)	causes pseudopolyps
when it heals with fibrosis Strictures colovesical	 Continuous spread
Colovaginal Fistulae	 crypt abscess DAML (Dysplasia associated Mucosal lesions) - 1 risk of
 Skip lesions present 	cancer
 Non – caseating granulomas differential diagnosis Tuberculosis 	 Cancer risk - after 8 - 10 yrs (Ulcerative colitis > crohn's) ↓ Goblet cells



2 Small and Leave Zeedback Large Bowel -Benign Conditions

crohn's disease

- C/F Mimic acute appendicitis
 Abdominal pain diarrhoea
- Diagnosis Biopsy
- Radiological signs : on barium meal follow through
- i) Stricture string sign of kantor (due to stricture in terminal ileum)
- ii) Aphthous ulcers target sign
- modified montreal classification - to assess the severity.
- Stool calprotectin -marker of Crohn's

management-medical

steroids—enema, oral, iv(rapid remission/control)
5-ASA derivatives
Azathioprine—steroid sparing effect
Infliximab—(for perianal disease in Crohn's Vedolizumab—integrin)

Surgical management-

conservative resection indications—1.complications like strictures, perforation, fistulae

- a. Toxic megacolon
- 3. Cancer(radical resection)

Ulcerative colitis

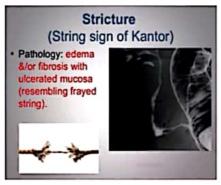
- C/F-bloody diarrhoea
- Diagnosis Biopsy
- Risk of toxic megacolon is higher if diameter is > 6 cm in large bowel
 - 1 Chances of rupture
- Severity of disease
 I.mild-<4 stools per day,no systemic signs
- a. moderate >4 stools/day,no systemic signs
- Sever->6 bloody stools/day with systemic signs
- Fulminant- >10 stools with toxic megacolon

indications for surgery

- 1. Steroid side effects +
- a. Not responding to medical management
- complications +
 surgery—Total proctocolectomy
 followed by IPAA (ilio—anal
 pouch anastomosis) J—shaped ilial
 pouch is anastomosed with
 anal canal

complications of surgery

- pouchitis(mc)-managed conservatively
- a. small bowel obstruction(MC complication associated with mortality)
 All extraintestinal manifestations resolve after surgery except-primary sclerosing cholan gitis, ankylosing spondylitis







Diverticular disease of colon

00:52:14

- -mc Site : Sigmoid colon
- -False diverticula
- -Only mucosa forms the diverticula
- -Comes out through Mesenteric border

Diverticulosis:

- 4th or 5th decade of life
- associated with constipation .
- Clinical features : . Constipation
- . Abdominal pain
- Complications
- 100: Barium enema (saw tooth appearance)
- management: Laxatives, manage complications, increase risk of cancer.

Complication of diverticular diseases

00:55:00

1. Bleeding:

- Mcc of massive lower GI haemorrhage
- -Right side diverticula bleeds more commonly.
- management : Angioembolization or resection

Conditions

a. Diverticulitis:

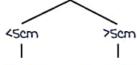
Hinchey Classification: 1 - Pericolic abscess

11 - Pelvic abscess

III - Purulent peritonitis

IV - Fecal peritonitis

- Clinical features: Abdominal pain, fever, diarrhoea 1, TLC
- 10C : CECT
- management : Pericolic abscess



Antibiotics

Pigtail drainage

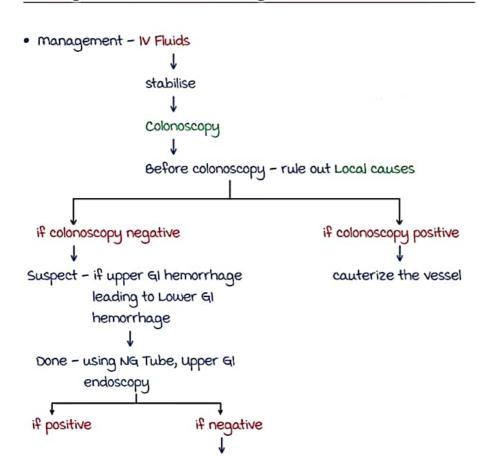
- Purulent & faecal peritonitis Hartmann procedure
- Diverticulitis can also give rise to Colovesical /Colovaginal fistula

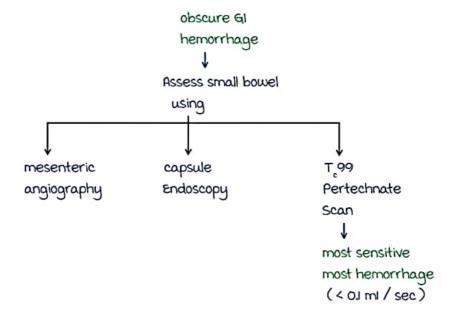
Angiodysplasia:

- Dilated submucosal veins.
- and Mc cause of massive lower GI haemorrhage
- Seen in elderly
- Right colon > left colon
- mc in Caecum
- Diagnosis: Colonoscopy /capsule endoscopy.

Lower gastrointestinal hemorrhage

01:03:58





Bowel tuberculosis (TB)

01:08:14

ulcerative T6	Hyperplastic TB
due to weak immune response m.c site - terminal ileum ulcers in TB in Typhoid horizontal longitudinal causes causes strictures perforation lead to Bowel obstruction	If there is strong immune response C/F- mass in right iliac fossa weight loss Obstruction Differential diagnosis - cecal cancer

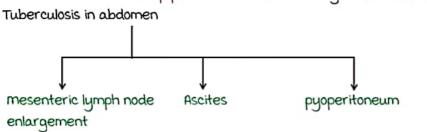
Radiological signs :-

Capsule Endoscopy



- Normal angle in ileocecal junction Acute
- In ileocecal junction TB the cecum is pulled up Causes obtuse angle

- 32 Small and Leave Fedback Large Bowel -Benign Conditions
- Goose neck deformity pulled up cecum + stricture at terminal ileum because of stricture - Proximal ileum - dilated
- Sterlein sign Narrowing of terminal ileum
- Fleischner sign / inverted umbrella sign Thickening of ileum
- Diagnosis colonoscopic biopsy to rule out cancer
- management Anti tuberculoid therapy
 - if Lump persists / obstruction Right hemicolectomy

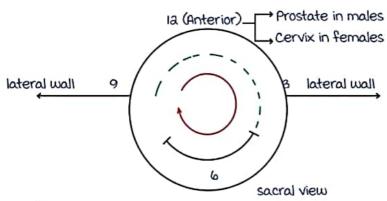


RECTUM AND ANAL CANAL

Digital Rectal Examination (DRE)

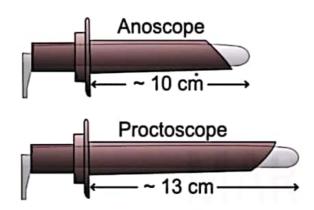
00:00:35

- most common position: Left Lateral / Sims' position
 In adults → right index finger
 children → little finger
- · External inspection :
 - External hemorrhoids
 - Fistula openings
 - Skin tags
 - Acute anal fissure: contraindication for DRE



Ist - finger along Posterior wall \Rightarrow Sacral hallow and - finger along Anticlockwise \Rightarrow lateral wall at 3'O clock position \Rightarrow anterior wall \Rightarrow prostate (males), cervix and pouch of douglas (POD) 3rd - finger in Clockwise \Rightarrow to check the lateral wall at 9'O clock position

- check for blood staining after DRE
- Anoscope and proctoscope



sigmoidoscope: 60 cm

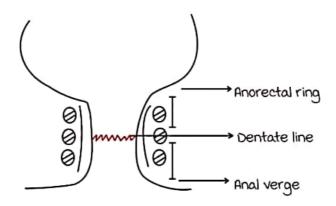
Sigmoidoscope



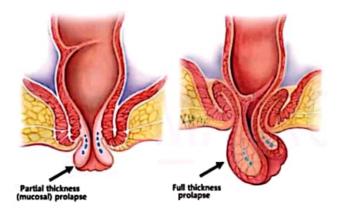
colonoscope: 110 - 140 cm
 upto caecum can be examined

Anatomy of rectum and anal canal

00:05:34



- · Rectum: 12-14 cm
- · mucosal folds: Houston's valve
- · Upper and lower part of rectum: convex towards right
- middle part : convex towards left
- · Lower rectum is not covered with peritoneum.
- · Below dentate line : pain can be felt
- · External > internal sphincter maintains continence



- Partial thickness prolapse
 - mucosal prolapse
 - Common in children
 - Due to an underdeveloped sacral curve
 - Seen after bouts of diarrhoea
 - management
 - 1st episode : digital reposition
 - · recurrent : Sclerotherapy, Thiersch wiring
- Full thickness prolapse
 - all layers involved
 - starts as a rectal intussusception
 - involves anterior wall
 - if > 5 cm in length, fold of peritoneum can be felt anteriorly by DRE
 - commonly, females > males

elderly

- management:

Surgery

Perineal approach

- Easier to perform
- Less operative complication
- High recurrence rate
- frail, elderly patients
- Eg: Thiersch wiring Delorme repair
 Altemier repair

(perineal rectosigmoidectomy)

Abdominal approach

- Technically demanding
- † operative complications
- Least recurrence rate
- · young, fit patients
- In young males, mobilization of rectum from sacrum causes injury to sacral nerves

Impotence

Eg: well's and Ripstein rectopexy
 Frykman Goldberg - Resection
 rectopexy

- Complications of abdominal approaches:
 - most common: constipation
 - impotence
 - mesh can erode into rectum
 - recurrence
- RED: Rectal evacuation disorder
 - starting point of rectal prolapse
 - starts as intussusception
 - evaluated by defecography
- SRUS: solitary rectal ulcer syndrome
 - ulcer in anterior wall
 - around 8 cm from anal verge
 - biopsy to rule out cancer.
 - management : STARR procedure

stapled Transanal rectal resection of intussusception

Anorectal malformations

00:25:12

if anorectal malformations are present, look for

vertebral defects

Anal atresia

Cardiac defects

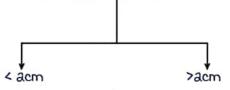
Tracheo -

Esophageal abnormalities

Renal anomalies

Limb abnormalities

- Investigation: Invertogram
 - Done around 24 hours
 - child is inverted
 - metallic marker is placed at anal opening
 - distance between tip of gas and metallic marker





Low anorectal malformation High anorectal malformation.

Investigation of choice in anorectal malformation: mRI

Most common abnormality ,
 in males → Rectobulbar fistula

if fistula with bladder neck, then outcome is poor.

in females -> Rectovestibular fistula

· Other examples:

males	Females
Perineal fistula	Perineal fistula
Rectourethral fistula	vestibular fistula – mc
Rectobulbar - mc	Persistent cloaca
Prostatic	
Rectovesical fistula	
Imperforate anus	Imperforate anus
Rectal atresia	Rectal atresia.

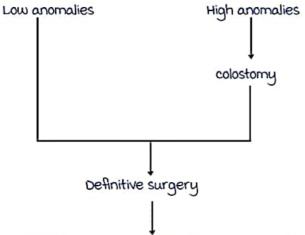
· Based on level of anomaly

High fistulae

Intermediate

Low Anal atresia

management of anorectal malformations.



00:32:18



- Also called as Jeep driver's disease / bottom.
- Seen in hairy men
- · most common site : natal cleft
- · Clinical feature: sinuses in midline natal cleft

pus(+)

- abscess
- management: Antibiotics

if pus⊕ — drain abscess

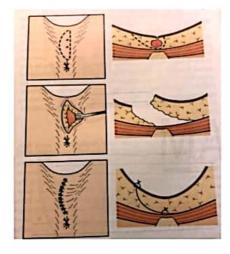
- To reduce recurrence: Trim hair

definitive surgery

- · Definitive surgery
 - Rhomboid / Limberg flap



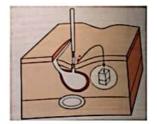
- Kardyakis surgery



Victive abace

- Bascom procedure

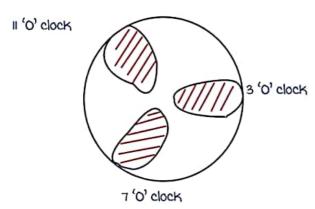




Hemorrhoids

00:36:12

- Also known as piles
- · most common cause for bleeding per rectum
- Due to bleeding from dilated vascular channels
- Pathology Loss of elasticity of anal cushions (failure to retract)
- · Sites of primary hemorrhoids



- \bullet Secondary hemorrhoids occurs in between the sites of 1°
- · clinical features:
 - constipation
 - painless bleeding P/R painful in External hemorrhoids Thrombosed piles
- Thrombosed pile





- Also called as melgney 5 day self healing lesion
- Painful
- Reddish / Bluish nodule
- Only hemorrhoids to be felt on DRE.
- management



Incision and evacuate clot

Antibiotics

Pain control

Later, definitive surgery

- Investigation of choice: proctoscopy
- Grades of hemorrhoids
 - 1 → only bleed; don't prolapse

 - prolapse but spontaneously reduceprolapse but have to be pushed inside

Management of hemorrhoids

00:42:40

- management depends on grade of hemorrhoids
- 1: Lifestyle changes Avoid fried / fatty food

High fibre diet

1 liquid intake

Laxative

Sitz Bath

11: Lifestyles changes + Banding > sclerotherapy

- sclerotherapy: most common agent: sodium tetradecyl SO injected in the submucosal plane at the apex above dentate line - causes fibrosis - hemorrhoids pulled up
- Banding: Rubber bands around pile

in 7 - 10 days, mass sloughs out

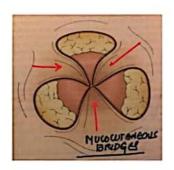
III: II + surgery

IV: surgery

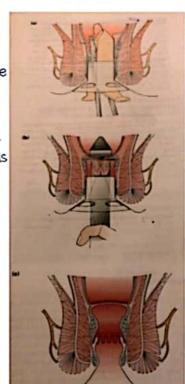
- Indication for surgery
 - 1. 111, 1V haemorrhoids
 - a .Grade 11 which does not respond to banding / sclerotherapy
 - 3. Thrombosed pile
- Surgeries:
 - 1. Open hemorrhoidectomy: milligan morgan hemorrhoidectomy



33 Rectum and 285 Back anal canal



- a. Closed hemorrhoidectomy: ferguson hemorrhoidectomy
- 3. Procedure of choice: stapled haemorrhoidopexy
 - Hemorrhoids are pulled up using a circular stapler
 - Purse string suture applied above the dentate line
 - Circular stapler applied above it
 - Stapler cuts a portion of mucosa and it hitches up the hemorrhoids



- 4. DGHL /HALO: Haemorrhoidal artery ligation operation
- · Complications of surgery
 - most common urinary retention
 - Reactionary hemorrhage
 - Pain
 - Incontinence
 - stenosis
 - recurrence
- Complications of haemorrhoids
 - Thrombosis
 - Fibrosis
 - Ulceration
 - Gangrene
 - Portal pyemia

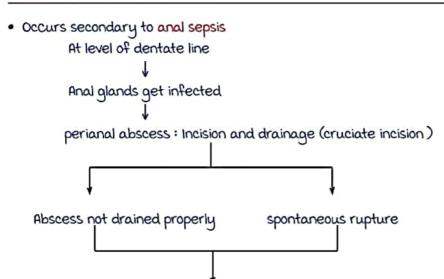
Anal fissures

00:55:10

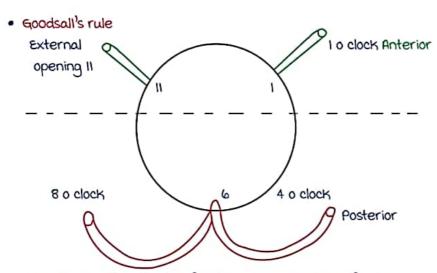
- Breach in continuity of anal epithelium
- most common: 1. posterior midline 6 '0' clock (ischemia) a. anteroior midline - 12 '0' clock (following vaginal delivery)
- Clinical features:
 - Painful bleeding P/R
 - Constipation
 - Hard stools
- chronic anal fissures are associated with a skin tag / sentinel pile



- Investigation of choice External inspection
- management:
 - Lifestyle changes
 - Laxative
 - sitz bath
 - Local application of a % xylocaine jelly Diltiazem cream Relaxes the Nitrate gel sphincter Common side effect : headache
 - Inj Botox
- Surgery
 - 1. Lateral anal sphincterotomy
 - Internal sphincter: pearly white circumferential fibres
 - complications : Incontinence
 - a. Anal advancement flap.
 - usually done in females with low anal tone and anterior fissures

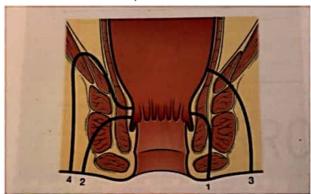


- Perianal fistula
- Clinical features
 - pus discharge P/R: staining of undergarment
 - pain
 - multiple perianal fistulae: watercan perineum
- · Conditions causing watercan perineum
 - 1. Crohn's disease (Krohn's)
 - a. Trauma (Krush)
 - 3. TB (KOch's)
 - 4. Cancer (Kancer)
 - 5. Immunocompromised
- · on examination,
 - external inspection
 see external opening
 - DRE feel the tract and internal opening



 Exception: Not applicable if external opening > 3cm from anal verge

- Investigation of choice: mR Fistulogram.
- Park's classification for perianal fistula.



- Intersphincteric (most common)
- a. Transphincteric
- 3. suprasphincteric / supralevator
- 4. Extrasphincteric (due to trauma)

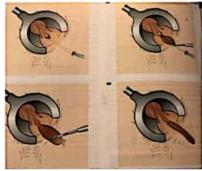
Management of perianal fistulae

01:11:57

- Based on level of opening High Fistula
 - above anorectal ring
 - Seton treatment

Low Fistula

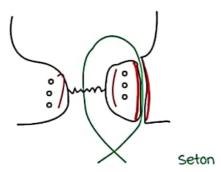
- below anorectal ring
- · fistulotomy, fistulectomy, LIFT, VAFT.
- Fistulotomy track is laid open Fistulectomy - entire tract is removed



- Fistulotomy / fistulectomy is not done for anteriorly placed fistulae. They are done for intersphincteric and transphincteric fistulae.
- LIFT: Ligation of fistulous tract
 - sphincter sparing procedure for transphincteric fistulae
 - incontinence does not develop
- VAFT: video assisted fistula therapy
 - plug / glue (cyanoacrylate) are used to fill the fistulous tract

management of high perianal fistulae:

seton treatment



- A thread (seton) passed through fistulous tract
- It is then tightened in serial intervals
- Seton gradually cuts the tract
- Seton types

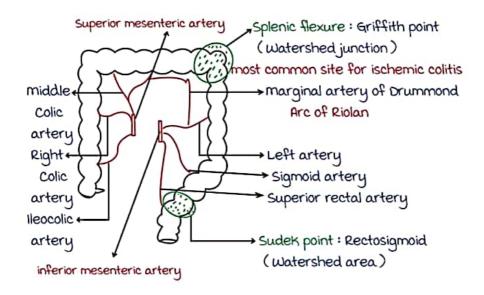
 Draining seton cutting seton
 crohn's disease
 multiple fistulae
- · strawberry lesion of rectosigmoid
 - infection by spirochaeta or B. fusiformis
 - bloody diarrhoea
 - sigmoidoscopy: multiple areas of oozing

(resembles over - ripe strawberry)

COLORECTAL POLYPS AND CANCER

Surgical anatomy of large bowel

00:00:13



Polyps: Hamartomatous polyps

00:05:02

· Polyps :

Hyperplastic Adenomatous Inflammatory Hamartomatous Pseudopolyps Polyps polyps polyps (ulcerative colitis) Tubular

Polyps

- Single juvenile polyp
- · Tubulo-villous no risk of cancer.
- · Villous
- Juvenile polyposis

Syndrome . SMAD 4 gene

- risk of cancer.
- Peutz Jegher syndrome
- multiple hamartomatous
- polyps in arborizing pattern
- Perioral melanosis +
- most common presentation-obstruction Increased risk of cancers-Pancreatic cancer(100% risk), periampullary cancer, colorectal cancer, thyroid cancer, duodenal adenocarcinoma

System

- STK-11/LKB I gene on chr : 19
- site : jejunum
- Cowden syndrome AD(autosomal dominant) PTEN gene mutation on chromosome 10 GI polyps are not premalignant associated with skin lesions increased risk of breast, thyroid and uterine cancer
- myhre Smith syndrome
- Cronkhite Canada Syndrome
- Cronkhite Canada Syndrome
 - multiple & polyps
 - Polyps are not premalignant
 - Ectodermal dysplasia T Alopecia. -Koilonychia
 - Bloody diarrhoea, anemia.

Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with Marrow Edition 4 videos.

Polyps: adenomatous polyps

0:14:11



OTubular polyps

② Villous polyps

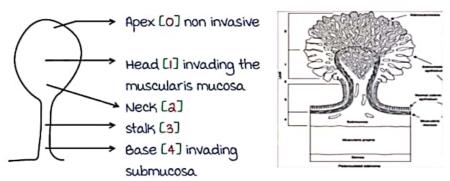
3 Tubulovillous polyps

1 1 risk of cancer.

- Premalignant:

 risk of colorectal cancer.
 - Larger the size
 - more the number
 - Sessile > pedunculated
 - Villous > tubular
- Villous polyps in rectum leads to hyponatremia, acidosis, hypoalbuminemia.

Haggitt classification



Till level a

Endoscopic resection of polyp Transanal polypectomy

In case of pedunculate polyp- Snare polypectomy

Sessile polyp - Infiltrate saline below polyp

Adenoma carcinoma sequence(classical pathway)

By-vogelstein

Normal epithelium

First /initial hit in APC gene on chromosome 5

Early adenoma

KRAS gene

Intermediate adenoma

Late adenoma

Final/late hit in P53 gene

Alternate pathway-mismatch repair gene(MSH fMLH gene are implicated)

Familial adenomatous polyposis coli syndrome

Carcinoma

00:22:36

Autosomal dominant
Chromosome 5-APC gene
>100 adenomatous polyps in colon (Attenuated FAP:<100 polyps)

I.

mutation present

\$\delta\$

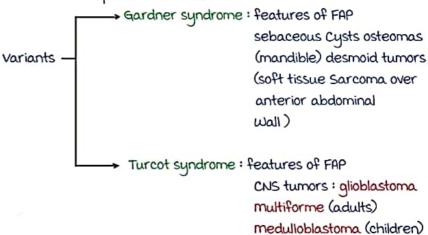
Screening-best modality

When polyps develop- perform IPAA

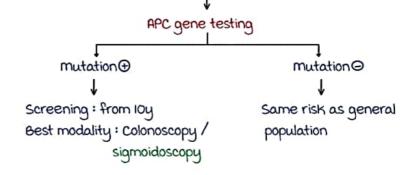
On endoscopy,



- 100% risk of colorectal cancer
- Diagnosis: Colonoscopy
- management: Total proctocolectomy followed by IAPA (ileo anal pouch anastomosis.)



- Associated with: CHRPE Congenital hypertrophy of retinal pigment Epithelium.
 Hepatoblastoma
- Genetic counselling 1st degree relatives



-If no polyps by 30 years -risk of FAP reduces

-mutation of mismatch repair gene (MSH2/MLH 1) mc

-These genes show micro satellite instability (MSI)

Detected by

Bethesda classification

-A/K/A Lynch surgery

Lynch 1 Lynch a

Increased risk of colorectal

extra colonic cancer uterine cancer-mc

Pancreatic cancer ovarian cancer gastric carcinoma

Diagnosis

modified Amsterdam Criteria

- I. Rule-out FAP
- a. Atleast 3 family members should be affected.
- 3. Atleast a successive generations should be affected.
- 4. Atleast 1 should be first degree relative.
- 5. Atleast 1 should be diagnosed before 50 years.

	FAP	HNPCC
Tumor initiation by APC gene	Accelerated	Normal
Tumor progression by p53 gene	Normal	Accelerated

Colorectal Cancers

00:35:16

00:29:17

- Risk factors
 - Alcohol
 - High fat diet
 - Red meat
 - 180 (uc > crohn's)
 - diverticular disease
 - Post cholecystectomy
 - Ureterosigmoid anastomosis (100% risk)
 - Adenomatous polyps
 - Syndromes
 - Selenium deficiency

ve space

Protective factors

- High fibre diet

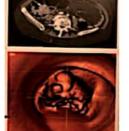
- Selenium supplementation

- NSAIDS

- Screening
 - 1) Best modality: Colonoscopy (100 140cm), every 10 years
 - a) Sigmoidoscopy: 60cms, every 5 years
 - 3) FOBT (Fetal occult blood testing), every year.
 - To be started in normal population: 50 years

High - risk: 10y before diagnosis of youngest relative

4) Virtual colonoscopy: CECT followed by 3D reconstruction.



 Very sensitive in detecting lesions > 6mm in size

	Conventional colonoscopy	Virtual colonoscopy
Time	Faster	-
muscle details	Better	-
Extramucosal details	-	Better

Clinical features

Right sided colorectal cancer	Left sided colorectal cancer
ulcerative lesion-bleed-Iron deficiency anemia	mc site- Rectum> rectosigmoid
Alteration of bowel habits-Late onset.	Alteration of bowel habits-Early onset- Increased frequency Tenesmus
Obstruction -late feature.	Obstruction- early feature
	Apple core deformity present

- -10C for diagnosis- Colonoscopic biopsy.
- 4-5% colorectal cancer Synchronous cancer/ Field cancerisation.
- 10C for staging-PET CT.
- 10C for TIN stage of rectal cancer- MRI with Endorectal coil.

Colorectal cancers: staging

TNM staging: 8th AJCC classification

Tis: Carcinoma in situ

TI: invades submucosa (above muscle layer)

Ta: invades muscle layer

T3: invades through muscle layer to connective tissue

T4a: invades through peritoneum T4b: invades any other structure

NI: 1-3 nodes

Na: 4 or more nodes

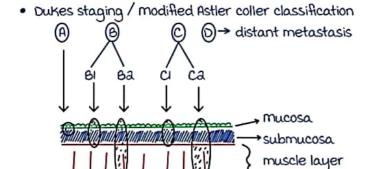
mia: I organ or site without peritoneal mets / non - regional lymph nodes

serosa

mib: a or more organs or sites without peritoneal mets

mic: multiple organs / peritoneal metastasis

- Minimum lymph nodes required for TNM staging = 12 nodes



(N)+ (N)+

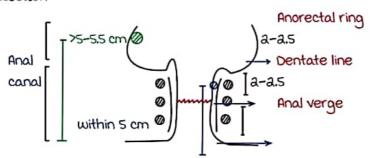
5 year A B C D survival 90% 60-70% 30% <30% rate

Rectal Cancers: Management

01:02:15

- Principles:
 - 1. Proximal margin → 5cm
 - a. Distal margin → acm
 - 3. Radial margin → 5cm

Rectum



if >5-5.5cm above the anal verge resection of rectum below peritoneal reflection

(lower 1/3rd of rectum) Low Anterior resection

- Removal part of Sigmoid colon & rectum

Colo-anal anastomosis (Circular stapler)

APR

- Abdomino perineal resection
 - Removal of rectum and anal canal
- Permanent end colostomy

Total mesorectal excision (TME)

by Heald

- because LN⊕ in mesorectum
- · Ta TME Trans and TME
 - Example of NOTES: natural orifice transluminal .Endoscopic surgery
 - In T, and some T, tumors

Surgery;

1. Tumour in caecum-Right hemicolectomy

(12-15 cm of terminal ileum + caecum+ ascending colon + hepatic flexure + go beyond right branch of middle colic arteries)

a. Tumor in ascending colon/hepatic flexure/transverse colon

Extended Right hemicolectomy (resection beyond splenic flexure)

Followed by ilio-colic anastomosis.

3. Tumor in splenic flexure/descending colon

Left Hemicolectomy

(From beyond right branch of middle colic arteries to sigmoid with high ligation of inferior mesenteric artery)

4. Tumor in Sigmoid colon

Low anterior resection

- Laparoscopic surgery has faster recovery and less pain compared to Open surgery.
- No difference in oncological outcome.

ERAS - Enhanced Recovery After Syrgery Protocol

Presurgical carbohydrate loading

- Adequate hydration and pain control
- Avoid NG tube / Drain
- Early mobilisation
- Early initiation of feeding

Chemotherapy:

- Included in LN + disease.
- T3/T4 lesion.
- FOLFOX = SFU, Oxiplatinum, Folinic Acid.
- FOLFIRI = 5 Fu, Folinic acid, Irinotecan
- CAPEOX = Capecitabine, Oxiplatinum
- Radiotherapy: only for Rectal cancer
- Chemotherapy can be given
 - in neoadjuvant setting * short course for 5-6 days followed by surgery.
 - * Long course down staging for weeks; wait for 6 weeks before surgery.
- Intracavity radiotherapy / Papillon technique / Contact Radiotherapy

PS: Signet ring cell in Rectal Ca biopsy - Poor outcome

- Immunotherapy: used for metastatic colorectal cancer.
 - Bevacizumab monoclonal Ab agonist VEGF
 - Cetucimab monoclonal Ab agonist EGFR
 - Panitumumab monoclonal Ab agonist EGFR
 - Pembrolizumab , Nivolumab PLD 1 inhibitor (used in patients with high MSI)
- mcc of death in colorectal cancer-liver mets
- most common site for distant metastasis → Liver
 - metastatectomy improves survival.
 Irrespective of number of mets if FLR (Functional Liver Reserve) > 25%
- · most important prognostic factor: Lymph node status > stage

Anal Carcinoma

01:20:35

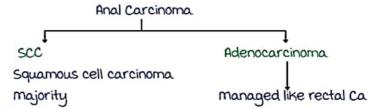


Anal SCC

- RISK factors : HPV

Anal Carcinoma

01:20:35



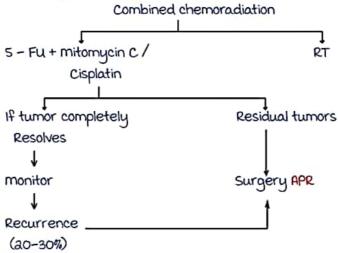
Anal SCC

- Risk factors : HPV

Immunocompromised, transplant patients

- Diagnosis: biopsy

- management : Nigro regime for 1 month



Inguinal LN gets enlarged in anal cancer

Note:

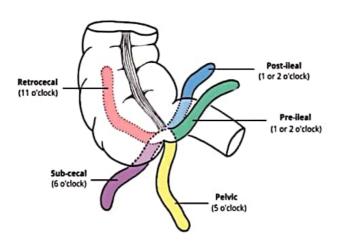
1. Colorectal cancer patient can come to emergency with obstruction:

- Hartmann procedure , Paul Mikulicz operation (proximal colostomy + take out distal mucus fistula)
- Resection and anastomosis
- Stents
- a. CEA -Tumor markers for colorectal cancer

APPENDIX

Surgical anatomy of appendix

00:00:11



- most common Retrocecal
 and most common Pelvic
 Least common / most difficult to diagnose post-ileal
- Appendicular artery Branch of lower division of ileocolic artery

 End artery
 Lies in the mesoappendix except at apex
 Terminal part prone to thrombosis
 Perforation is most common at apex
- Accessory appendicular artery Artery of Seshachalam
 Branch of posterior caecal artery
- Appendix → Base has a constant location
 At the junction of 3 taenia coli

Acute appendicitis: Etiology

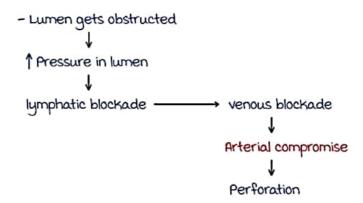
00:04:02

Acute appendicitis
 Catarrhal (Non - obstructive)

Common in children

System

Obstructive appendicitis



· most common cause of obstruction: faecolith (CaPO,) Others courses: Ascariasis Foreign body Carcinoid tumor

Acute appendicitis: clinical features

00:07:00

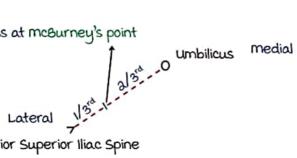
- Rare in infants
 - Common in children (male = female)
 - max incidence: Teenage (male > female)
 - Can be seen in adults also
- mantrels scoring system / modified Alvarado score

Characteristic	Points
migration of pain Anorexia Nausea and vomiting Tenderness Rebound pain Elevated temperature Leukocytosis Shift of white blood cell count to the left	Symptoms Signs Signs A A A A A A A A A A A A A
Total	10

- If score <5 ---- unlikely 5 or 6 — → possible 7 or 8 — → likely 9 or 10 ----- highly likely

- Symptoms anorexia. fever (late / uncommon)
- Signs

- Tenderness at mcBurney's point



Anterior Superior Iliac Spine

- Rovsing sign: Pressure on left iliac fossa → pain in right iliac fossa
- Psoas sign / Cope psoas test Hyperextension of right hip

Flexion of right hip against resistance Pain

- Obturator sign - Flexion and internal rotation of right hip

pain

- Non specific signs:
 - · Dunphy sign pain on coughing
 - Ten horn sign pain on pulling right testis
 - Aaron sign form pressure in right iliac fossa → Pain in epigastrium.
- Signs of appendicitis based on location
 - Retrocecal appendicitis
 - Psoas sign (+)
 - Patient can keep his right leg in flexion.
 - Pelvic appendicitis
 - Irritate rectum : pelvic diarrhoea

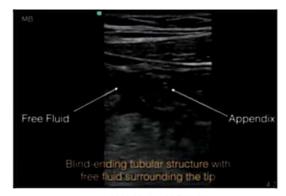
tenesmus

- Irritate bladder: † frequency of micturition
- Pain on digital rectal examination
- Post-ileal appendicitis
 - Hardly any signs elicited
 - Slight pain on deep pressure

Differential diagnosis of acute appendicitis

00:19:08

- Infants and children
 - Yersinia: mesenteric adenitis fever is common
 - Intussusception
 - Bowel obstruction
 - ureteric colic
 - meckel's diverticulitis
- · Adult
 - ureteric colic
 - Gastroenteritis
 - Bowel obstruction
 - Torsion
- Adult females
 - mittelschmerz : mid -cycle ovulatory pain
 - Endometriosis
 - Pelvic inflammatory disease
 - Ectopic pregnancy
- Elderly
 - Diverticulitis
 - Ureteric colic
 - Obstruction
- Investigation of choice
 - in adults : CECT
 - In children: USG → elongated tubular structure non compressible blind ending probe tenderness free fluid Diameter > 6 mm



USG: Appendicitis

Management of acute appendicitis

management - Appendicectomy

Incision in open appendicectomy

- Grid iron incision (muscle splitting) Rutherford morrison incision (muscle cutting) (Emergency appendicectomy)
- Lanz inclusion / skin crease / Bikini incision (Interval appendicectomy)
- Rocky-Davis incision
- Lower midline incision appendicular perforation.
- steps
 - Identify base of appendix junction of 3 taenia coli
 - If appendix not inflamed, search last a feet of ileum for inflamed meckel's diverticulum
 - If appendix is inflamed,
 - Stump of appendix < 4-5mm
 - if long stump → stump appendicitis
 - If base is inflamed bury the stump (Do not crush the base) purse string suture Z-stitch
 - If base is gangrenous and cecal wall is gangrenous → Right hemicolectomy
- Appendicitis in Crohn's disease
 - If Crohn's discase is controlled: Appendicectomy
 - if active Crohn's disease : conservative management
- In laparoscopic appendicectomy
 - 3 trocars : Infraumbilical Hypogastric Left iliac fossa

Complications of appendicectomy

00:40:25

- 1. Hemorrhage
- a. Injury to iliohypogastric nerve: increased incidence of right inquinal hernias.
- 3. Wound infection (most common)
- 4. Fecal fistula
- 5. Portal pyaemia
- 6. Stump appendicitis
- 7. Adhesive intestinal obstruction (most common long term complication)

Appendicular perforation

00:42:30

Conditions where perforation can occur:-

- i) Infants, children: omentum not fully developed
- a) Elderly: vessels of omentum atherosclerosed
- 3) Pregnancy
- 4) Adhesions
- 5) Immunocompromised
- Appendicitis most common extrauterine abdominal emergency in pregnancy
 - Pain is felt slightly above mcBurney point
 - If perforation occurs → high chance of fetal loss.

Appendicular lump

00:47:08

a. Temperature

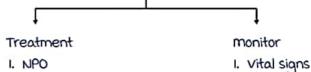
3. Size of lump

4. Tenderness

drainage of abscess

- ullet Late presentation, bowel becomes adherent o appendicular lump .
- Management : Ochsner Sherren Regimen

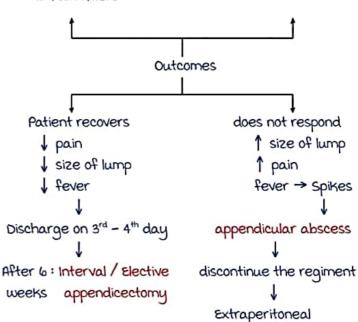
(Conservative management of appendicular lump)



- I. NPO
- a. IV Fluids
- 3. IV Antibiotics
- (for aerobes + anaerobes)

mc : Bacteroides

4. Pain Killers



Appendicular tumors

00:53:11

- most common: carcinoid tumor (Appendix most common site)
- most common malignant appendicular tumor → mucinous adenocarcinoma
- management of appendicular carcinoid:
 - If tumor < a cm in size § → simple appendicectomy > a cm from base
 - If tumor > a cm in size or < a cm from base } → Right hemicolectomy
- mucinous adenocarcinoma
 - diagnosis: imaging and HPE
 - management : right hemicolectomy followed by chemotherapy

Pseudomyxoma peritonei

00:57:03

- Jelly like deposition in peritoneal cavity → locally invasive
- · Tumors that can give rise to pseudomyxoma peritonei
 - 1. Primary peritoneal tumors
 - a. Secondary to adenocarcinoma of appendix
 - 3. Secondary to mucinous adenocarcinoma of ovary
- Clinical features
 - Abdominal distension
 - Bowel obstruction
 - Clumped up omentum or caking of omentum
- Diagnosis: Omental biopsy
- · Staging PET CT
- management
 - R₁ / R₂ resection
 Cytoreductive Surgery (CRS)/
 Debulking surgery
 - CRS includes, Appendicectomy or Right hemicolectomy
 (based on the condition of appendix)
 In females → TAH + BSO
 Omentectomy
 Peritonectomy

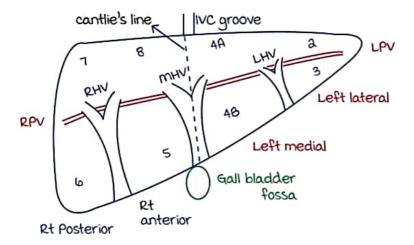
- HIPEC: Hyperthermic intraperitoneal chemotherapy
 - Administered during surgery
 - Paclitaxel + mitomycin C at 41 44°c
 - Systemic chemotherapy
 Paclitaxel + Carboplatin

LIVER-1

Surgical anatomy of liver

00:00:15

Functional anatomy - Couinaud "



- middle hepatic vein mhv
- Left hepatic vein LHV (lies beneath falciform ligament)
- · LPV Left portal vein
- · RPV Right portal vein

Recent questions on liver anatomy

00:06:30

- Couinaud division in based on hepatic vein and portal veins
- major fissures : Hepatic veins 3 major fissures

minor fissures : 3 RPV fissure

- LPV fissure

- Fissure of Ganz

Sectors in the liver - 4

- 1) Right posterior
- a) Right anterior
- 3) Left medial
- 4) Left lateral

GB fossa segment 48 & 5 removed in radical cholecystectomy for gall bladder cancer.

Segment 7 - right posterosuperior segment - Bare area of liver (MC site for amoebic liver abscess)

Liver resections

00:11:51

Brisbane classification

Right hepatectomy

Left hepatectomy

Left trisectorectomy

Left trisectionectomy

Extended left hepatectomy

4A, 4B, a, 3

5, 8

Right trisectorectomy

Right trisectionectomy

5, 6, 7, 8, 4A, 4B

Extended right hepatectomy

Segment 4 - Quadrate lobe Segment 1 - Caudate lobe (Independent segment)

- · Arterial supply both left and right side
- Biliary drainage in both from left & right side

4A, 4B, a, 3

5, 6, 7, 8

· venous drainage directly into IVC

Undergoes hypertrophy in Budd-Chiari syrdrome.

Segment I subdivided into



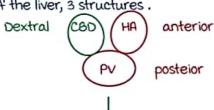
· Segment 1 - early involvement in hilar cholangiocarcinoma.

Liver pedicle

00:18:10

eternalsoul_494@yahoo.com

At the hilum of the liver, 3 structures .



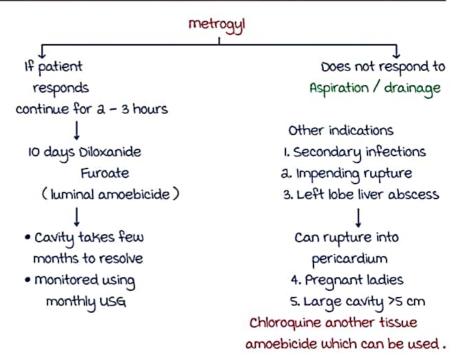
A/K/A mickey - mouse view on USG

Liver abscess

Pyogenic liver abscess	Amoebic liver abscess	
1) Polymicrobial infection MC organism — E. Coli MC organism in Asia — Klebsiella MC organism children with chronic — S. Aureus granulomatous disease	 1) Entamoeba histolytica flask shaped ulcers in bowe Portal vein → Liver. 	
 a) Spread mainly via the biliary tree → ascending cholangitis Hematogenous Direct extension 	a) Right lobe(mc) affected.	
3) Solitary = multiple (50%) (50%) 4) CF - fever with spikes,pain more toxic	3) Usually solitary 4) Asymptomatic fever pain Less toxic	
5) 1 ALP (m/c) 1 PT/ INR	5) 1 PT/INR (MC) 1 ALP	
6) F > m Elderly immunocompromised	6) m > F	
7) 10C: USG/CECT	7) IOC: USG / CECT Serology can confirm the diagnosis	
8) -	8) Anchovy sauce pus	
 9) management: • Broad spectrum antibiotics • Early aspiration if patient doesn't respond. • Pigtail catheter 	9) Start metronidazole (tissue amoebicide) double strength responds a - 3 weeks	

Management of amoebiasis

00:29:17



Complications of amoebic liver abscess

00:32:51

1. Rupture
 mc site - Subdiaphragmatic > pleural > peritoneal
 2. Secondary infection.

Hydatid disease

00:34:15

- Organism: echinococcus granulosus
 Echinococcus multilocularis (multiple cysts)
 A/K/A malignant hydatid
- Definitive host : dog
- Intermediate host: sheep
- Accidential intermediate host: Human
- -mc organ affected: Liver >Lungs

C/F:

- 1. Asymptomatic
- a. Hepatomegaly
- 3. Pain

Diagnosis

-10C: USG → Gharbi classification

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WHO-IWGE 2001	Gharbi 1981	Description	Stage
CEI	Type I	Unilocular unechoic cystic lesion with double line sign	Active
CE2	Type III	Multiseptated, "rosette-like" "honeycomb" cyst	Active
CE3 A	Type II	Cyst with detached membranes (water-lily-sign)	Transitional
CE3 B	Type III	Cyst with daughter cysts in solid matrix	Transitional
CE4	Type IV	Cyst with heterogenous hypoechoic/hyperechoic contents. No daughter cysts	Inactive
CES	Type V	Solid cyst with calcified wall	Inactive

WHO-IWGE CLASSIFICATION OF ULTRASOUND IMAGES OF CYSTIC ECHINOCOCCOSIS CYSTS

-serology to confirm diagnosis

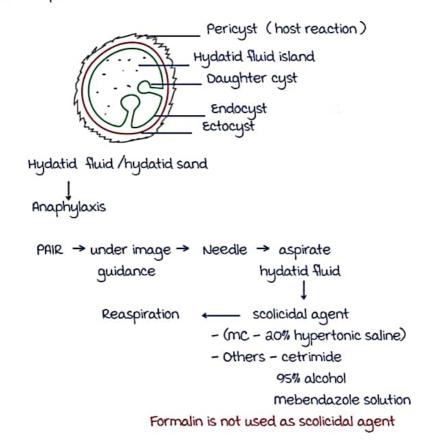
Management of hydatid liver disease

00:40:11

1. Albendazole

First line of management of liver ydatid

- P Percutaneous
- A Aspiration
- 1 Injection
- R Reaspiration



Contraindications for PAIR

- 1. Dead / calcifled cyst
- a. Deep seated cyst
- 3. Impending rupture
- 4. Extrahepatic cyst
- 5. Multiloculated cyst
- 6. Cysto-biliary communication

If scolicidal enters gall bladder

causes chemical cholangitis

Surgery for hydatid cyst

00:47:03

- 1. Cystopericystectomy
- 11. multiple cysts liver resection
- 111. Capitonnage Spiral suturing of cavity

LIVER - 2

One - liners liver tumors

00:00:15

mc benign tumor of liver - Hemangioma and MC benign tumor of liver - FNH (Focal Nodular Hypoplasia) mc malignant tumor of liver - metastasis(2° from other site) MC primary malignant tumor of liver Hepatocellular cancer MC primary tumor in children - Hepatoblastoma

Liver hemangioma

00:01:46

mc benign tumor of the liver

CF: Asymptomatic

: Sometimes large hemangiomas can develop

Kasabach-merritt syndrome

Consumption coagulopathy (Consumes all platelets)

Bleeding

IOC - CECT



CECT

- 1. Non contrast phase Hypodense
- a. Arterial phase peripheral nodular enhancement
- 3. washout phase Homogenous enhancement
- Thin capsule
- Giant liver hemangioma > 5cm

mRI - Light bulb sign

management - Observation

If large and symptomatic

Angioembolization

Focal nodular hyperplasia

00:05:07



- and mc benign tumor of liver
- F > m
- and 5th decade of life

etiology - unknown

- Proposed mechanisms (2° to vascular insult to liver)

HPE - Hepatocytes

Bile duct structure

- Kupffer cells Hot spot on Tc 99m scan (sulphur colloid)
- unencapsulated

CF - Asymptomatic / Incidental diagnosis

IOC - CECT

Central stellate scar

Due to central arteriole

- No risk of malignant conversion

management - observation

Hepatic adenoma

00:08:54

- -F>> m
- strongest association with OCPs
- 3rd 5th decade of life

HPE: Sheets of hepatocytes

- : But no bile duct structures
- : No kupffer cells

- 10 % patients with adenoma can show malignant conversion

CF: • majority - asymptomatic

- Incidental diagnosis
- Abdominal pain
- Risk of spontaneous rupture

V

Non traumatic hemoperitoneum

10C - CECT

management - All liver adenomas need to be resected

Bordeaux classification

- 1. Inflammatory maximum risk of bleeding
- a. HNF I alpha mutated maximum risk of being multiple- Common in young patients
- 3. eta catenin mutated
 - max risk of malignant conversion
 - Seen in male patients on anabolic steroids

Other benign lesions

00:15:51

- 1. Multiple liver hamartoma syndrome
- A/K/A von meyenburg disease
- multiple cystic liver hamartomas (< 1.5cm)
- failure of regression of embryonic biliary duct

Clinical features - asymptomatic

IOC - CECT

- ↑ Risk of cholangiocarcinoma
- Association with polycystic Kidney disease management – observation
- a. Peliosis hepatis
- multiple cavernous hemangiomas of liver
- Immunocompromised
- Patients on anabolic steroids

IOC - CECT

management - observation

Hepatocellular cancer

00:18:47

- LI-RADS (Liver Imaging Reporting and Data Systems)

LR-1 (100% benign)

LR-a (probably benign)

LR-3 (intermediate probability for HCC)

LR-4 (probably HCC)

LR-5 (100% definite HCC)

- mc 1° malignant tumor of liver

Risk factors

- 1. Hepatitis B Earlier Hepatitis B(MC) but due to vaccination
- a. Hepatitis C 17 times

↓ incidence

Active space

- 3. DM 4. Obesity
- 5. Alcohol
- 6. Cirrhosis of liver
- 7. alpha 1- antitrypsin deficiency
- 8. Hemochromatosis
- 9. Wilson's disease
- 10. Thorotrast exposure (THCC, Cholargiocarcinoma, RCC) vinyl chloride - 1 Risk of angiosarcoma

CF

- -m>F
- 4th 6th decade
- mc and earliest feature hepatosplenomegaly
- Abdominal pain
- -Jaundice (late sign)

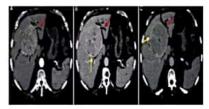
Paraneoplastic syndromes

- 1. Hypoglycemia(mc)
- a. Hypercholestrolemia- mc biochemical paraneoplastic syndrome
- 3. Gynecomastia
- 4. Hypocalcemia

Work up of hepatocellular carcinoma

00:25:09

10C Triple phase CT -Helps to differentiate HCC from other metastasis



Phases Non contrast

Arterial

Washout

HCC

Hyperdense



Hypodense



metastasis

Hypodense

Hypodense

Hypodense

Tru-Cut biopsy can be used to confirm the diagnosis

Staging - PET CT

Tumor markers - alpha Fetoprotein (AFP) (mc)

- PIVKA 11 (Protein induced vitamin K antagonism) A/K/A Des -Carboxy prothrombin
- Glycipan
- · HepPar 1

Child-Pugh (CP) scoring:-

Official and Lab Outrals	Points*			
Clinical and Lab Criteria	1	2	Severe (grade 3 or 4) Severe (diuretic refractory)	
Encephalopathy	None	Mild to moderate (grade 1 or 2)		
Asciles	None	Mild to moderate (diuretic responsive)		
Bilirubin (mg/dL)	<2	2-3	>3	
Albumin (g/dL)	> 3.5	2.8-3.5	<2.8	
Prothrombin time Seconds prolonged	4	4-6	>6	
International normalized ratio	<1.7	1.7-2.3	>23	

Child-Turcotte-Pugh Class obtained by adding score for each parameter (total points)

Class A = 5 to 6 points (least severe liver disease)

Class B = 7 to 9 points (moderately severe liver disease)

Model for End Stage Liver Disease (MELD) Score

MELD = 3.78 x log_e serum bilirubin (mg/dL) +

11.20 x log_e INR +

9.57 x log_e serum creatinine (mg/dL) +

6.43 (constant for liver disease etiology)

NOTES:

- If the patient has been dialyzed twice within the last 7 days, then the value for serum creatinine used should be 4.0
- Any value less than one is given a value of 1 (i.e. if bilirubin is 0.8, a value
 of 1.0 is used) to prevent the occurrence of scores below 0 (the natural
 logarithm of 1 is 0, and any value below 1 would yield a negative result)

MELD Na* score - value of serum Na* also included

PELD - Pediatric End Liver Disease score

Used for transplant (Includes albumin, bilirubin, INR growth failure, age < 1 yr)

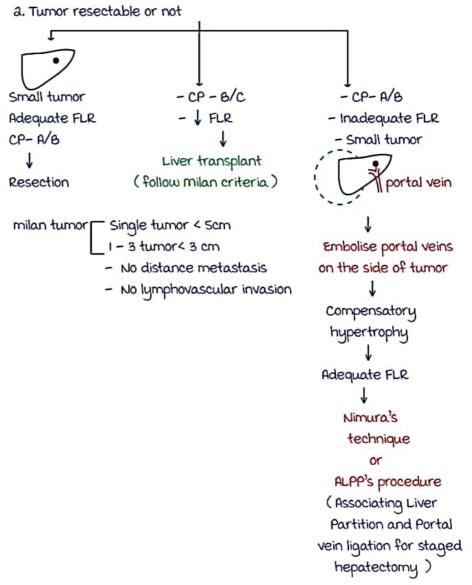
Management of hepatocellular carcinoma

00:34:23

Localized Advanced disease

Principles

Functional liver reserve > 25%
 (FLR measured by fibroscan)



warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with marrow Edition 4 videos.

Management of advance disease

00:42:44

Only palliative management

- 1. Sunitinib / Sorafenib / Regorafinib
- a. TACE (Transarterial chemo embolisation)
- TARE (Transarterial radio embolisation, using Yttrium spheres)
- 4. Radio frequency ablation (tumor < 3 cm)
- 5. Microwave ablation
- 6. HIFU (High frequency ultrasonic therapy)
- 7. Intralesional ethanol avoided

most important prognostic factor - stage of disease mc site of distant metastasis - lungs

Prognostic indicators

Okuda CLIP BCLC B - Bilirubin Tumor size Tumor score A - Ascites child pugh score child pugh score AFP Performanc status T - Tumor size A - Albumin (Barcelona Clinic portal vein thrombosis Score)

Karnofsky/ECOG score for performance status



Fibrolamellar variant

00:48:39

- Young patients
- m = F
- Non cirrhotic liver
- · « FP (1)
- Neurotensin B Tumor marker

Hepatoblastoma

00:49:35

- mc 1° malignant tumor in children
- Tumor of fetal hepatocytes
- Majority present within 18 months

Almost all cases < 3 years age

Associated with FAP syndrome

CF - mass

- Anemia
- Thrombocytosis

10C - CECT

management- If localised - completely cured by surgery and chemotherapy

> 50 % patients with lung metastasis also respond very well to chemotherapy

Epitheloid hemangioepithelioma

00:52:17

- Rare vascular tumor
- Associated with COCP intake Vinyl chloride

multiple lesion in both the lobes

CF - Infants and children - high output cardiac failure

- Fulminant liver failure
- malignant conversion into angiosarcoma

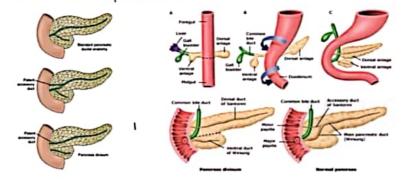
10C - CECT (Hypervascular tumor)
HPE - Factor VIII staining
Management - Resection of lesion

BENIGN PANCREATIC CONDITIONS

Pancreas divisum

00:00:16

- most common congenital anomaly of pancreas
- Failure of fusion of Dorsal and ventral pancreatic buds
- Increases the risk of pancreatitis



management:

- Asymptomatic → no management required
 Diagnosis → MRCP / ERCP
- · If increased risk of pancreatitis:
 - Sphincterotomy

Annular pancreas

00:02:24

- malrotation of ventral pancreatic bud
- · Encasement of duodenum (usually second part of duodenum)
- · Clinical features: Projectile vomiting
 - non bilious vomiting is more common than bilious vomiting
- X Ray → Double Bubble sign.
 Diagnosis → CECT (10C)

management:

Duodeno duodenostomy is better than Duodenojejunostomy.



- If common channel is present between bile duct and pancreatic duct, it increases the risk of pancreatitis.
- Sphincter of oddi comprises of four sphincters.

Sphincter of oddi dysfunction

00:06:49

Pancreatic Pancreatitis



- Biliary pain
- Post cholecystectomy syndrome
- more common in females compared to males
- Diagnosis: ERCP with manometry (10c) (more than 40 mmHq)
 - · MRCP with secretin stimulation

milwaukee classification

Type I (mc): Pain + abnormal hepatic or pancreatic enzymes on a Fixed occasions + dilated common bile duct / pancreatic duct. Stenosis

Type 11 : Pain + either abnormal enzymes or dilated common bile duct / pancreatic duct.

Type III: Pain alone.

management:

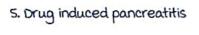
Type 1 : Best response to ERCP and sphincterotomy Botox injection → high recurrence rate. Advantages -> good candidate for ERCP and Sphincterotomy.

Acute pancreatitis

00:11:04

Causes:

- 1. Gall stone induced pancreatitis. (mc)
- a. Alcohol (second most common)
- 3. Trauma (mc. in children)
- latrogenic → post ERCP



Thiazide Diuretics + ART Chemo Drugs Azathioprine

- 6. Hyper parathyroidism
- 7. Increased triglyceride
- 8. Pancreas divisum
- 9. Idiopathic
- 10. Scorpion bite

Clinical features:

- more common in males as compared to females
- Epigastric pain radiates to back and is relieved by bending forward.
- Nausea and vomiting. Signs: Severe acute (hemorrhagic pancreatitis)
- Cullen's sign →Discolouration around umbilicus
- Grey turner's →discolouration in the flanks
- Fox sign → discolouration in inguinal region.
- Bryant 's sign → discolouration in the scrotum

Acute pancreatitis: investigations

00:16:50

First → Serum amylase and serum lipase

- → Sensitive but → Rises late not specific → more sensitive and
- → Increase serum more specific amylase
 - Acute pancreatitis (4 times the normal value)
 - mesenteric ischaemia
 - Bowel perforation
 - Volvulus
 - Torsion
- Serum amylase and serum lipase, values are not predictive of severity of attack.
- Non specific signs :
 - Sentinel loop sign
 - Colon cut off sign
 - Gas less abdomen

Colon cut off sign





- 10C → CECT (Idealiy done after 7a hours)
 - If done before 72 hours, it can under estimate amount of necrosis.

Glasgow criteria → 3 or more than 3 → severe pancreatitis

Ranson's criteria → Different for alcohol and gall stone (I point each)

On admission:

- WBC more than 16,000 / ml
- Age more than 55 years
- Glucose more than a00 mg/dL
- · AST more than aso 14/L
- · LDH more than 350 14/L

Within 48 hours of admission:

- Hct dercrease more than 10 %
- BUN increase more than 5 mg / dL
- Serum calcium more than 8 mg/L
- Artèriai po, less than 60 mmHg
- · Base deficit more than 4 mEq/L
- · Fluid needs more than 6 L

Ranson score less than $3 \rightarrow 0 - 3\%$ mortality Ranson score = 3 - 5 → 11 - 15 % mortality Ranson score more than equal to 6 → 40% mortality

more than or equal to 3 →severe pancreatitis.

BISAP score: (1 point each)

BUN more than a 5 mg/dl I mpaired mental status SIRS

A age more than 60 P leural effusions

BISAP score less than $a \rightarrow 0 - 0.5\%$ mortality BISAP score = a → a% mortality

8 Benign
Pancreatic
Condition

BISAP score more than equal to $3 \rightarrow 5 - 20\%$ mortality

• more than or equal to $3 \rightarrow$ severe pancreatitis

- → C Reactive protein value more than 150 14/L L->Severe
- APACHE → Acute physiology and chronic health evaluation,
 score → 8 or more than 8
 severe
- APACHE O (obesity)
- SAPS → Simplified acute physiology score
- HAPS → Harmless acute pancreatitis score
- modified marshall score → a or more than a denotes organ dysfunction.

Balthazar grade → CT Severity index (Best) → 6 or more than 6 → Severe pancreatitis.

Normal pancreas
 Focal or diffuse enlargement of the pancreas
 Pancreatic gland abnormalities and peripancreatic inflammation
 Fluid collection in a single location
 Two or more collection and/or gas bubbles in or adjacent to pancreas

Pancreatitis necrosis	points
 No necrosis 	0
 Necrosis of one third of the pancreas (less than 30%) 	a
 Necrosis of the one half of the pancreas (30 - 50) % 	4
 Necrosis of more than one half of the pancreas 	
(more than 50%)	6

Atlanta. classification: Local complication

mild → ←

moderate → ←

Severe → ←

Organ dysfunction

Transient (< 48 hours)

Acute peripancreatic collection	Acute necrotic collection
 less than 4 weeks In interstitial pancreatitis Homogeneous — fluid density Not fully defined wall Adjacent to pancreas Confined to normal fascial planes 	 less than 4 weeks In necrotizing pancreatitis Heterogeneous collection Not fully defined wall Intra — or extra pancreatic

Pseudocyst	walled - off mecrosis
	 more than 4 weeks In necrotizing pancreatitis Heterogeneous collection Well - defined wall

Management of acute pancreatitis

00:31:45

- Nil per oral (NPO)
- I. V. fluids
- I. V. antibiotics → only used if → necrosis ⊕ → injection ⊕ Antibiotic of choice → meropenem
- Early initiation of Enteral nutrition.
 - → Nasojejunal route preferred
 - → reduces mortality.
- Gall stone pancreatitis: -
 - → If patient has severe jaundice which is not resolving
 - → Symptoms more than 48 hours

ERCP and Sphincterotomy

· Patients with gall stone pancreatitis should undergo cholecystectomy before discharge.

Condition

Systemic

· SIRS

Sepsis

ARDS

moos

· CHF

septic shock

- · Acute peripancreatic collection
 - > External drainage with pigtail catheter
- Acute necrotic collection
 - → External drainage or surgical necrosectomy
 - → Beger's technique (very high mortality rate)
- Pseudocyst
- · Walled off necrosis
 - → External drainage
- Splenic vein thrombosis → left sided portal hypertension
- Splenic artery pseudo aneurysm
 - → m. c. vessel involved.
- · Left pleural effusion.

Pseudocyst

00:41:06

- → Lined by granulation tissue
- → more common in chronic pancreatitis than acute pancreatitis
- → most common site → Lesser sac but can be seen anywhere in abdomaen.



D'Egedio classification

Type 1 → Acute pancreatitis → no communication with main pancreatic duct.

Type II → Acute an chronic

pancreatitis -> may or may not have communication with main pancreatitis duct.

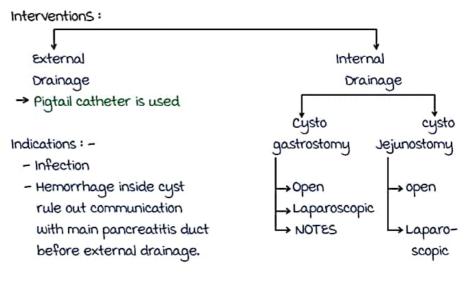
Type III -> Chronic pancreatitis -> usually have communication.

Clinical features:

- → Epigastric pain
- → Fullness
- → Nausea and vomiting
- > 10C > CECT

management:

- → majority of pseudo cysts resolves spontaneously
- → Indications for intervention
 - 1. Cyst is more than 6 weeks old
 - a. more than 6 cm in size
 - 3. Wall thickness is more than 6 mm.



Complications of pseudocyst surgery:

- 1. m. c → Hemorrhage
- a. Infection
- 3. Injury to adjacent structures.

Complications of pseudocyst

00:49:32

- I. m. c. → Infection.
- a. Hemorrhage inside cyst.
- 3. Rupture

mimic a cystic neoplasm of the pancreas

- CEA values in cyst fluid are less than 400 ng/ml

Chronic pancreatitis

00:51:03

 \rightarrow Due to acute pancreatitis \downarrow Stimulation of myofibroblasts
TGF eta activation

Causes: -

TIGAR - O classification

T → Toxins → • Alcohol

1 → Idiopathic • Dietary

G → Genetic / Hereditary → Spink 19 PRSS gene → Tropical

A → Autoimmune (19 G4)

calcific pancreatitis

R → Recurrent (AC)

kerela cassava

0 → Obstruction

Condition

Diagnosis - HISORT criteria H → Histology - lymphocytic infiltration 1 → Imaging s → serology 1 lg 64 0 → Other organism RT → Response to steroids

Clinical features:

Exocrine Endocrine Pain Insufficiency Insufficiency → Ineffective → Pancreatic enzymes → Insulin drainage malabsorption → Stones in MPD → DM

steatorrea

Investigation: -

- Fecal fat analysis
- Fecal elastase analysis
- · NBT PABA

management:-

Exogenous supplement - tion of enzymes

Insulin or oral hypoglycemic agents

 EUS → Rosemont criteria

 Calcium Carbonate

stones

· IOC → MRCP

with secretin stimulation

 Gold standard → ERCP

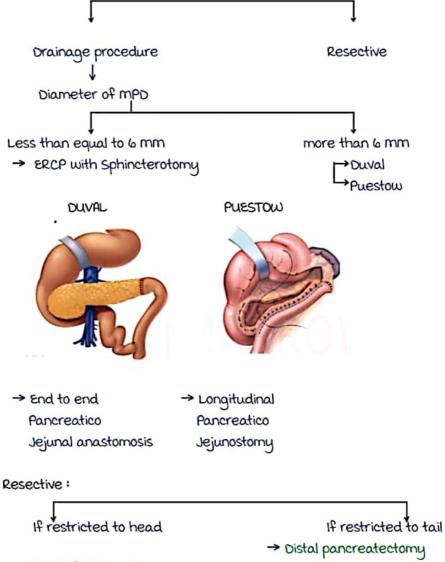
management: -→ Analgesics and no interventions till patient responds to Analgesics

ERCP → Chain of lakes

→ Stops responding Intervention :-



Surgery • v2.0 • Marrow 4.0 • 2020



- → BEGER'S Procedure
- → Duodenal preserving Pancreatic head resection

Puestow + Beger → Frey's procedure.

MALIGNANT PANCREATIC DISORDERS

Pancreatic ductal adenocarcinoma

00:00:20

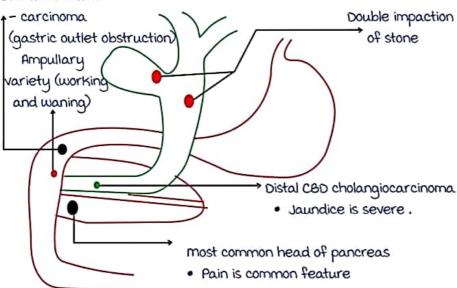
Risk factors :-

- 1. Obesity
- a. Dm
- 3. African, American
- 4. Alcohol consumption
- 5. Hereditary pancreatitis → PRSS 1 gene (50 70 times)
- 6. Tropical calcific pancreatitis → SPINK I gene.
- 7. Chronic pancreatitis
- 8. Syndromes:
 - Peutz Jeghers syndrome 1 100 times
 - · BRCA2 mutations
 - · HNPCC
 - FAP → periampullary cancers
 - Familial atypical melanoma syndrome.
- most common gene mutated → K RAS
- most common histology → Pancreatic ductal adenocarcinoma.

Periampullary cancer

→ Group of 4 cancers which are situated within a cm of ampullary opening.

Duodenal adeno -



System

most common presentation →

- I. Obstructive jaundice (progressive)
- a. Distended gall bladder

Courvoisier's Law → obstructive joundice with palpable gall bladder is seldom due to stone disease.

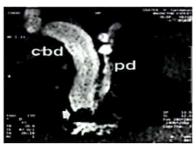
exceptions to Courvoisier's law →

(Stone disease cause obstructive jaundice and palpable gall bladder)

- 1. Double impaction
- a. Oriental Cholangio hepatitis
- 3. Primary CBD stones
- migratory thrombophlebitis (Trosseau syndrome)

Investigations:

- 10C → CECT
- mrcp/ercp → Double duct sign.

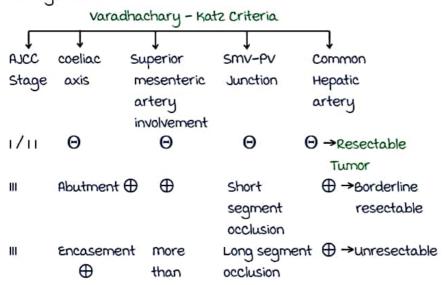


- x-ray → widening of c loop.
- Duodenography → Frosberg inverted 3 sign.
- 10C for staging → PET CT.

	7 th	8 th
П	Tumor limited to the pancreas , ≤ a cm in greatest dimension.	maximum tumor diameter less than or equal to a cm.
та	Tumor limited to the pancreas, more than a cm in greatest dimension.	maximum tumor diameter more than 2 or less than or equal to 4 cm.
Т3	Tumor extends beyond the pancreas but without involvement of the celiac axis or the superior mesenteric artery	maximum tumor diameter more than 4 cm.

T4	Tumor involves the celiac axis or the superior mesenteric artery (unresectable primary tumor)	Tumor involves the celiac axis, common hepatic artery or the superior mesenteric artery. Adjacent structures.
NO	No regional lymph node metastasis.	No regional lymph node metastasis.
NI	Regional lymph node metastasis.	metastasis in 1-3 regionar lymph nodes.
Nа	1-	metastasis in more than regional lymph nodes.
mo	No distant metastasis	No distant metastasis
m I	Distant metastasis m. c. site → LIVER	Distant metastasis

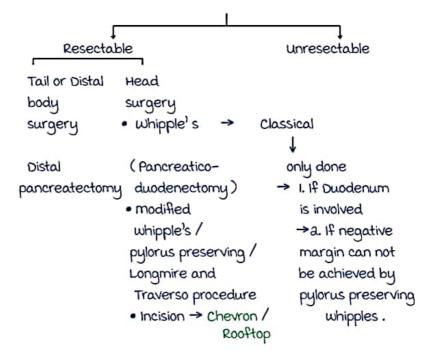
management:

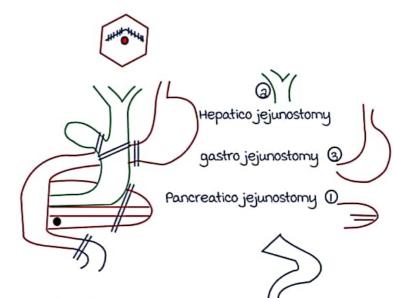


Other criteria:

- malignant ascites
- Distant metastasis
- · Peritoneal disease / omental disease.

Tail or Distal	Head		
body	surgery		
surgery	 whipple's - 	>	Classical
0 0	•		↓
Distal	(Pancreatico-		only done
pancreatectom	y duodenectomu	1)	→ 1. If Duodenum





complications of whipple's:

- most common → Impaired gastric emptying
- a. Hemorrhage.
- 3. Anastomotic leak -> most common cause of death. most common → Pancreatico jejunostomy → can be managed conservatively.
- 4. Cardiovascular complications
- 5. Recurrence

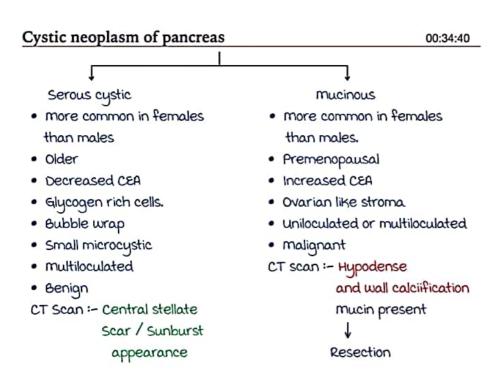
disorders

- Chemotherapy ->
- Nodal disease present
- · T/T

- Gemcitabine
- Gemcitabine + capecitabine
- NAB Paclitaxel
 (Albumin bound)
- Radiotherapy → pancreatic bed
- most important prognostic factor → stage

Unresectable: Palliative in nature chemotherapy Jaundice / Jaundice Pain Pruritus + medial stenting Gastric outlet Coeliac (ERCP) obstruction ganglion Triple bypass block Gastro - Jejunostomy Hepatico - Jejunostomy

Jejuno - Jejunostomy



Intraductal papillary mucinous neoplasm

00:34:40

- · IPMN
- males are more commonly affected than females.
- Certain studies have found both genders are equally affected



Fish mouth deformity

Diagnosed by ERCP

- → Ohashi triad:
 - Dilated hepatopancreatic duct
 - Fish mouth deformity
 - mucin extruding from opening

Branch Duct type main duct type management: multifocal Observation malignancy All lesions should be resected

most commonly seen in head of pancreas.

Solid pseudopapillary tumor/Gruber Frantz/ Hamoudi tumor & Endocrine tumor

00:42:10

- Females
- Child bearing age
- β catenin/vimentin mutation
- Tail → malignant, slow progression
- management → Resection

Endocrine tumor

Insulinoma

- most common endocrine tumor
- ullet cells of islets of Langerhans
- Evenly distributed throughout pancreas.
- Benign (> 90 %)
- Encapsulated

Clinical features:

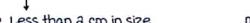
- → Whipple's triad → Fasting hypoglycemia
 - Blood glucose less than 40 mg/dl
 - Rapid resolution on giving glucose

Diagnosis:

Gold standard → 72 hours fasting test

- Increased fasting Insulin levels
- Insulin: glucose → more than 0.3
- C-peptide analysis → raised in insulinomas
- Localization :- Best → intra-op USG.

management:



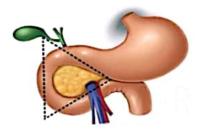
- Less than a cm in size
- Enucleation
- Benign

malignant

- Radical surgery can be done
- Liver most common site
- Diazoxide → decreases insulin secretion

Gastrinomas

- Zollinger Ellison syndrome
- Most common pancreatic endocrine tumors in MEN I syndrome.
- most common site → wall of first part of duodenum.



Gastrinoma triangle/passaro triangle → is bounded by -

- Junction of cystic duct with common hepatic duct
- Junction of second and third part of duodenum
- · Junction of head and neck with the body of pancreas
- Gastrinoma which lie outside the triangle are more aggressive, poor prognosis.
- more than 70 80 % gastrinomas are malignant.

Clinical features:

- Zollinger Ellison triad
- 1 gastrin
- 1 acid output

- Non β cell tumor
- multiple and recurrent peptic ulcer disease (most common pain)
- Peptic ulcers at atypical locations
 - → 0,/0,/Jejunum
- Diarrhoea

Diagnosis:

· Serum gastrin more than 1000 pg/ml

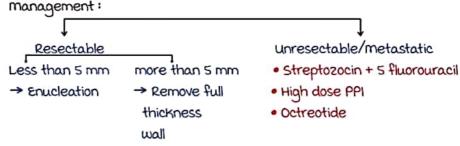
(diagnostic)

Sometimes less than 1000 pg/ml

→ Secretin/pentagastrin.



- · Gastric pH less than a
- Basal gastric output → less than 15 1Whour.
- Localization → SRS → somatostatin receptor scintigraphy
- EUS → Best
- All patient with ZES should be tested for MEN I syndrome



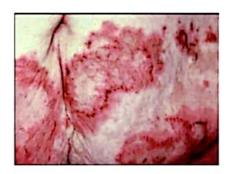
Pancreatic ZES → Larger tumors - poor prognosis

If complete resection → excellent survival.

Glucagonoma

00:59:30





- ullet Tumor of lpha cells of islets of langerhans
- · Diabetes mellitus
- Dermatitis → migratory rash (necrolytic)

disorders

Angular stomatitis

Anaemia

Vipoma :- vasoactive intestinal peptide.

- malignant tumors
- WDHA syndrome/verner morrison syndrome
- WD → Watery diarrhea
- H → hypokalemia
- A → Achlorhydria. Acidosis
- more common in males than females
- Tail / distal part

Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with marrow Edition 4 videos.

Non functional pancreatic endocrine neoplasm

01:02:10

- · Non functional
- · 30 50 %
- Elderly
- malignant
- most commonly → head

Clinical features: -

- Abdominal pain
- Jaundice
- Pancreatitis (rarely)

Difference between functional & Non functional



- → Chromogranin A
- → Synaptophysin

Difference between Pancreatic vs Non-functional

Cancer

Tumors

- Less than 5 cm
 more than 5 cm
- Chromogranin 4
- Hypodense
- Hyperdense
- Calcification
 - can be seen

Somatostatin

Negative

Positive

receptor

Scintigraphy

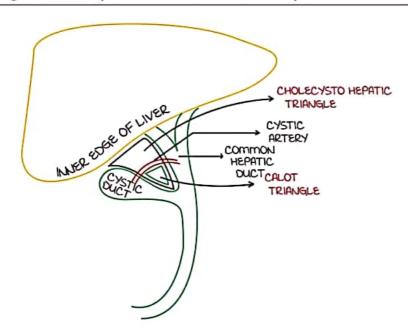
management: Resection → Radical Surgery

- m.C.Site → Liver
- metastatic disease -> Streptozocin,
 5 fluorouracil, interferon

GALL BLADDER AND BILIARY TREE - 1

Surgical anatomy of Gall Bladder and Biliary tree

00:00:19

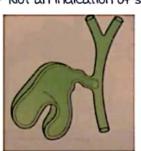


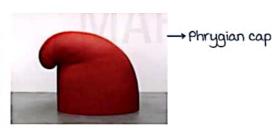
- Calot Triangle
 Bound by:
 - → Cystic Artery
 - → Cystic Duct
 - → Common Hepatic Duct

Cholecystohepatic triangle:

Bound by:

- → Cystic Duct
- → Common Hepatic Duct
- Cystic Lymph Node of Lund: 1st draining Lymph node in Gall Blader cancer
- mounihan Hump:
 - Tortuous Right Hepatic Artery in calot's tringle
 - → injured during cholecystectomy
- Phrygian cap / phrygian Gall Bladder
 - → Gall Bladder assumes shape of a phrygian cap
 - → Not an indication of surgery



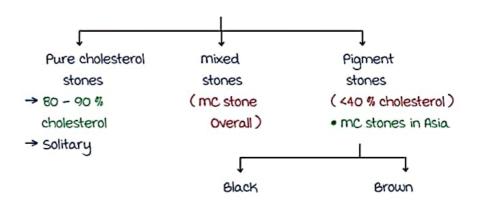




344 Gastrointestinal 40 System

- · Gall Bladder:
 - → Lacks submucosa
 - → Subserosal Lymphatics → Drain into Liver capsule
 - → valve of Heister at Gall Bladder neck.
 - → Functions:
 - 1. Concentration of Bile
 - a. Reservoir of Bile
 - 3. Secreting mucin .

Gall stones 00:07:05



- → In Haemolytic
- → infected bile
- Disorders:
- · Cholangitis
- G6PD Deficiency
 Sickle cell anemia
- Clonorchis
- Spherocytosis
- Cirrhosis
- → Composition:
- Ca Bilirubinate
- insoluble bilirubin pigment polymer (+)
- Ca Palmitate
 Ca stearate
- Ca BiCarbonate
- Ca Phosphate
- Risk Factor
 - →F>m
 - → Obesity
 - → OCP / Clofibrate
 - → Ileal Resection
 - → Rapid Weight loss
 - → Post vagotomy
 - → Inflammatory Bowel Disease
- 90 % → Radioluscent
- 10 % → Radiopaque



Seagull sign (Biradiate sign)



mercedes Benz sign (Triradiate sign)



→ Radiopaque

IOC: USG → Post Acoustic shadow



- Post Acoustic Shadow



→ Gall Bladder Polyp .l.

No post acoustic shadow

Presentations of gall stones

00:15:16

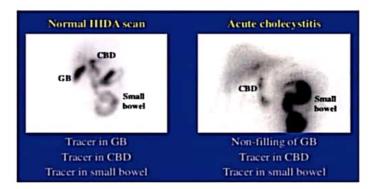
- Asymptomatic stones
 - → management : Conservative
 - → Indications for cholecystectomy in asymptomatic stones
 - 1. Diabetes mellitus
 - a. Stones and Gall Bladder polyps
 - 3. Stone with porcelain Gall Bladder
 - 4. Stone > a cm in size or multiple small stones
 - 5. In patients undergoing Bariatric surgery
 - 6. Salmonella Typhi carrier
 - 7. Endemic zone of Gall Bladder cancers



→ Porcelain Gall bladder

- a. Acute cholecystitis
 - → Clinical Features: Right upper quadrant pain Nausea and vomiting
 - → On Examination: Tenderness in Right upper quadrant
 - → murphy's sign: Patient catches his / her breath when pressed in Right Hypochondrium.

- → Boa's sign: Hyperesthesia in the region of 12th Rib
- → loc: USG Abdomen
- → Gold Standard: HIDA (Hepatobiliary iminodiacetic Acid) scan
 - Higher Accuracy than ultrasonography
 - In 90 % patients dye reaches → gall bladder in 30 min. → Bowel in I hour
 - In Acute cholecystitis → Non visualisation of Gall Bladder
 - Also used to diagnose → Biliary Atresia



Management of acute cholecystitis

00:24:08

based on Tokyo consensus Guidelines

Grade III: Severe

cholecystitis + Organ dysfunction

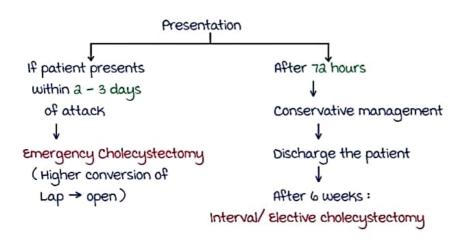
Grade 11: moderate Acute Cholecystitis +

Any one:

- → WBC > 18,000
- → Duration of symptoms > 72 hours
- → Gangrenous cholecystitis
- → emphysematous
- → Pericholecystic Abscess

Grade 1: Mild cholecystectomy

- management: → NPO (Nil Per Oral)
 - → 1. v Fluids
 - → 1. V Antibiotics: Gram negative coverage
 - Anaerobic coverage
 - → Analgesius



Other presentations of gall stone

00:30:11

Acalculus cholecystitis

→ Seen in: ICU patients

Total parenteral Nutrition

→ Clinical features : Right Hypochondriac pain Nausea and vomiting sepsis

→ Diagnosis: USG

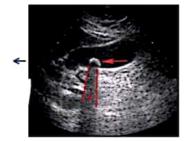
→ management : Supportive care Surgery if condition does not improve

Chronic cholecystitis

→ IOC : USG

→ Wall Echo Shadow Sign. (WES)

→ WES is specific for chronic>acute



Emphysematous cholecystitis

- → Common in Diabetic and immunocompromised patients
- → m. C organism: clostridium
- → Emphysematous pyelonephritis → E. coil



· Gas in gall bladder and gall bladder wall

→ Diagnosis: USG

→ IOC : CECT

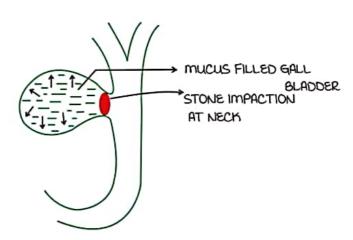
- → management: NPO
 - I.V fluids
 - I.V Antibiotics
 - Emergency cholecystectomy
 - Sometimes patient is too sick to undergo surgery

Tube cholecystostomy

If patient recovers

Cholesystectomy

mucocele



- → Bile absorbed
- → Aseptic dilation of gall bladder due to impaction of stone at neck
- → Diagnosis: USG
- → management : Cholecystectomy
- \rightarrow 1f mucocele is infected \rightarrow Empyema of Gall Bladder

mirizzi syndrome

→ Due to inflammation, gall bladder becomes adherent with common Bile Duct.



→ Clinical features: - pain

- Jaundice

Stone pushes against the CBD

Obstructive

Jaundice

Final stage: Fistula between

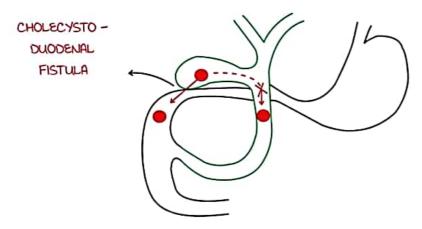
Gall Bladder and

common Bile Duct.

- → Diagnosis: mRCP (magnetic Resonance Cholangio Pancreatico graphy)
- -> management : Cholecystectomy

Gall stone ileus:

→ Dynamic bowel obstruction because of Gall Bladder stone



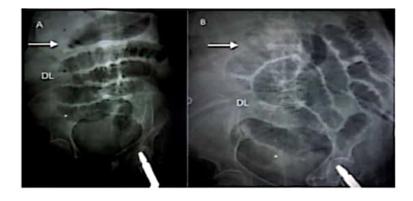
Note: Gall bladder and duodenum becomes adherent \rightarrow Formation of cholecystoduodenal fistula \rightarrow stone directly comes down into duodenum and obstructs the bowel \rightarrow gall stone ileus

- → m.c site: Terminal 60 cm of ileum / distal ileum
- → Sometimes: Stone can cause Gastric outlet obstruction

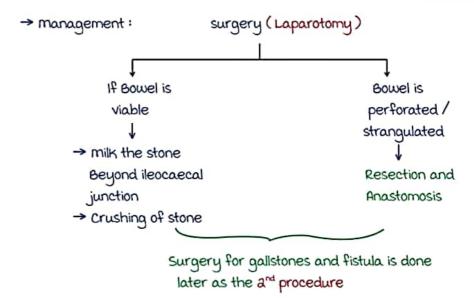
Bouveret syndrome

→ Rigler's Triad

- 1. Pneumobilia
- a. Features of small intestine obstruction
- 3. Radiopaque shadow in Right lower quadrant



→ IOC : CECT



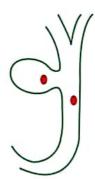
Choledocholithiasis

00:49:22

- stone in CBD is called choledocholithiasis
- → Clinical features:
 - 1. Asymptomatic
 - a. Obstructive jaundice
 - 3. Cholangitis:

Charcot triad: • Intermittent pain

- intermittent fever
- intermittent jaundice



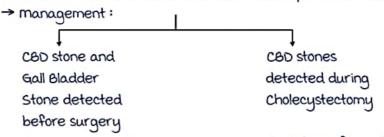
Reynolds pentad

Charcot triod

Septic shock

Altered mental status

- → IOC : MRCP
- → IOC for common bile duct microliths: Endosopic ultrasound



Followed by Cholecystectomy Sphincterotomy after 7-10 Days 1. History of jaundice

a. TALP

3. USG: Dilated CBD

40 Gall bladder 35 dback and Biliary tree - 1

Diameter > 1cm

Best: Laparoscopic
Cholecystectomy

Laparoscopic CBD exploration

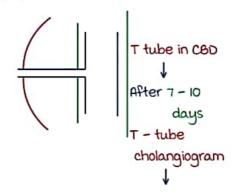
→ If laparoscopic CBD exploration cannot be done → open CBD exploration

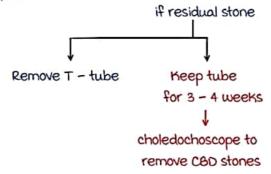
- ERCP (Endoscopic Retrograde Cholangio Pancreaticography)
- → side viewing endoscope used:





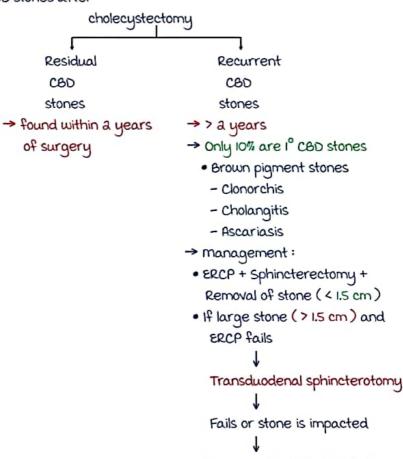
- → Cut in the sphincter is made at 11 0' clock
- → mc complication : Pancreatitis
- -> Duodenal perforation
- → Air bubbles can also mimic common bile duct stones
- → ERCP diagnostic 9 therapeutic





• Technique of putting T tube and managing CBD stone: Burhenne Technique.

CBD stones after



Supraduodenal choledochotomy

- · In CBD
 - → Incision : Longitudinal
 - → Not made at 3 and 90' clock
 - → Sutured using: Absorbable (Vicryl / PDS suture)
 Knots on outside of lumen

Gall stone pancreatitis
Associated with gall bladder cancer

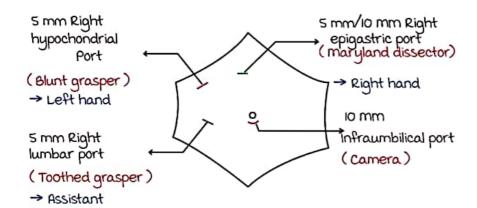
GALL BLADDER AND BILIARY TREE 2

Laparoscopic and open cholecystectomy

00:00:13

Laparoscopic cholecystectomy

- Surgery for gall stones
- · Laparoscopic cholecystectomy is surgery of choice
- Position : Reverse Trendelenburg & right side up
- Surgeon: Left side
- Assistant : Left side
- Conventional Laparoscopic cholecystectomy:



 SILS (Single Incision Laparoscopic surgery) → 1 rates of umbilical hernia



Critical view for cholecystectomy

if calot's triangle anatomy not properly defined

fundus - first cholecystectomy

Complications of Laparoscopic cholecystectomy:

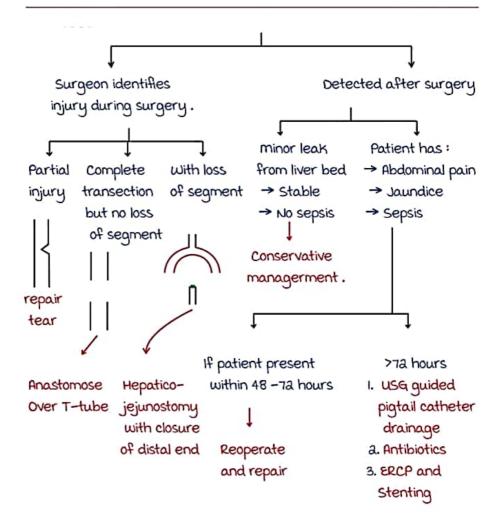
- 1. Hemorrhage
- a. Injury to bile ducts
- mc complication: Right shoulder tip pain(retained CO₂ beneath right dome of diaphragm)
- Stricture: MC Common hepatic duct (Laparoscopic cholecystectomy)
 MC Common bile duct(open cholecystectomy)

- 5. Post cholecystectomy syndrome Cause:
 - (1) Retained CBD stones
 - (a) Biliary dyskinesia
 - (3) sphincter of oddi dysfunction (SOD)
- frozen calot's → 4 -5%

Open cholecystectomy

→ Right subcostal incision (Kocher's incision)

Bile leak 00:11:12



- · Long term complication of bile duct injury : stricture
- mc bile leak after laparoscopic cholecystectomy is from:
 Cystic duct stump

Strasberg classification for bile duct injury.

Types	Nomenclature	
Type A	Bile leak from the cystic duct/accessory duct/small ducts in liver bed without loss of continuity	
Type B	Occlusion of an aberrant duct with loss of continuity with the common bile duct	
Type C	Complete transection of the aberrant right hepatic duct with loss of continuity with the common bile duct	
Type D	Partial lateral wall injury to the CHD or CBD	
Type E1	CHD injury, beyond 2 cm from the primary confluence	
Type E2	CHD injury, less than 2 cm from the primary confluence	
Type E3	Injury at the confluence; confluence is intact	
Type E4	Injury at the confluence; confluence separated	
Type E5	Injury to the aberrant right posterior sectoral duct along with stricture of the CBD	

Gall bladder cancer

00: 19: 21

- · Risk factors :
 - 1. Gall stones (>90% patients with gall bladder cancer have associated stones)
 - a. Salmonella typhi carrier
 - 3. Gall bladder polyps: Adenomatous polyps

(porcelain gall bladder) > 1 cm in size

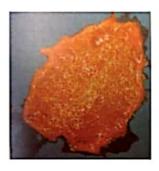
multiple

calcified gall bladder

> 60 years



- Cholesterosis
 - → Strawberry gall bladder: Deposition of cholesterol crystals in gall bladder wall.
 - → Not a risk factor for gall bladder cancer.



41 Gall Bladder 355dback & Billiary tree 2

- 5. Abnormal pancreaticobiliary duct junction (APBDJ)
 - → 1 Gall bladder cancer
 - → 1 cholangiocarcinoma
- 6. Endemic zone
- 7. Alcohol
- HPE: Adenocarcinoma
- mc Type: Infiltrating
- mc site : fundus
- Clinical features: MC presentation: Gall bladder mass
 - Not going to retain shape
 - mobility is restricted
 - Jaundice-late feature
 - · Liver is most common site of metastasis.

Investigation and management of gall bladder cancer 00:26:03

- · IOC : CECT
- staging: PET-CT

T stage:

T, A: Above muscle layer
T, B: involves muscle

T : Perimuscular connective tissue

T3: Adjacent structures → Liver, duodenum

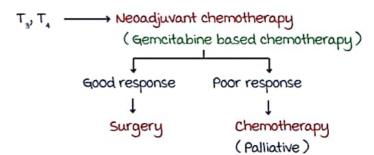
T.: Involvement of hepatic artery, portal vein .

- management:
 - A: Simple cholecystectomy

→ B: Radical cholecystectomy

T_a : Radical cholecystectomy

- Removal of:
- · Gall Bladder
- Lymph node along hepatoduodenal ligament
- Segments 48 and 5 of Liver.
- ± CBD → only removed if involved.



tree 2

If patient undergoes Laparoscopic cholecystectomy:

TA Gall bladder cancer

(incidentally)

→ Nothing is detected

→ No role of Laparoscopic

port site excision in TI GB cancer.

TB Gall bladder

cancer

Radical

cholecystectomy

- Tumour marker: CA 19 9
- most important prognostic factor: 'T' stage / Depth of invasion.

Cholangiocarcinoma

00:34:58

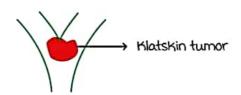
- · RISK:
 - 1. Choledochal cyst
- a. Anomalous pancreaticobiliary duct junction (APBDJ)
- 3. 1° sclerosing cholangitis: Inflammatory condition
 - → Associated with IBD (ulcerative colitis)
 - Antinuclear and anti smooth muscles antibodies
 - → m > F
 - → multiple strictures in biliary tree
 - → ↑ Risk of cholangiocarcinoma
 - → Clinical features: Obstructive Jaundice
 - → Diagnosis: mRCP / ERCP



→ primary sclerosing cholangitis

- → Gives rise to multifocal tumors
- → Doesn't resolve after colectomy
- 4. Periampullary
- 5. Alcohol
- 6. Thorotrast

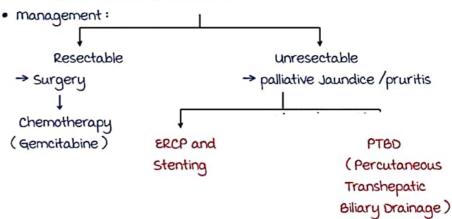
- 7. Clonorchis
 - mc site : Hilum

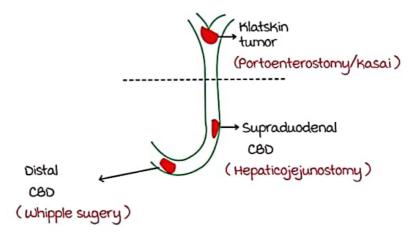


Bismuth - Corlette classification :

Туре	Bismuth-Coriette Classification of Perihliar Tumors	
1	Tumor involves common hepatic duct	
11	Tumor involves bifurcation of the common hepatic duct	
IIIa	Tumor involves the right hepatic duct	עני עני עני
шь	Tumor involves the left hepatic duct	
IV	Tumor involves both right and left hepatic ducts	

- · loc: mrcp
- · Staging : PET-CT
- mc site of distant metastasis: Liver





41 Gall Bladder 559dback & Billiary tree 2

Dilatation of Biliary tree



· Todani / modified Alonso-Lej classification:



- → mc : Diffuse dilatation
- → 1b : Pancreatic extension





- → Diverticulum of CBD
- 1b: Pancreatic

-) B:

Type III:



→ Dilatation of intraduodenal portion (choledochocele)

Type IV



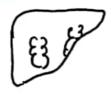
Intrahepatic

Extrahepatic ducts dilated



Only extrahepatic ducts dilated

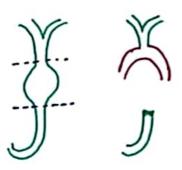
Type V:



- → Dilatation of only intrahepatic ducts (Caroli's Disease)
- → Sign : Central dot Sign

System

- · Clinical features: Lump Pain Jaundice 10% Risk → cholangiocarcinoma
- · IOC : MRCP
- management:
 - → Type 1: Roux-en-Y hepaticojejunostomy



- → Type 11: Cut diverticulum + repair C&D
- → Type III: ERCP + sphincterotomy
- → Type IV A, Type V: Transplant
- → Type IV B: Kasai procedure (portoenterostomy)

Extrahepatic biliary atresia

00:52:29

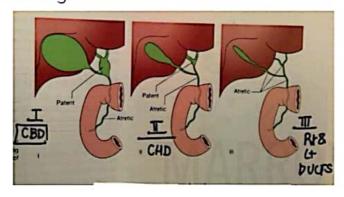
- Inflammatory fibrosis of biliary tree.
- I in 12000 live births
- m=F
- · Fibrosis of biliary tree



- Atresia
- Cirrhosis → Liver failure
- Associations:
 - → Situs inversus
 - → Cardiac lesions
 - → Absent inferior venacava
 - → Polysplenia
 - → Preduodenal portal vein
- Clinical features:
 - → Jaundice at Birth
 - → Pruritis
 - → Pale stools
 - → Liver failure

tree 2

- · TALP
- Extrahepatic atresia
 - → IOC : HIDA Scan
 - → Gold standard: Intraoperative cholangiogram
- Intrahepatic atresia → Liver biopsy
 USG: Triangular Helps to differentiate
 cord sign it from neonatal hepatitis
- Types of Biliary atresia:



- · management:
 - → Type 1: Roux-en-Y hepaticojejunostomy
 - Progressive fibrosis after surgery
 - Best result-surgery done < 8 weeks
 - → Type II and III: Kasai procedure
 - · If fibrosis: Liver failure



Haemobilia and bilhemia

01:00:06

Haemobilia

- · Bleeding from biliary tree
- Rare cause of upper GI hemorrhage
- · Conditions:
 - → latrogenic → post ERCP

 → post Percutaneous transhepatic biliary drainage
 - → Trauma
- · Clinical features : Quincke's triad
 - → Jaundice
 - → upper GI Hemorrhage (malena)
 - -> Pain
- Diagnosis: CT Angiography
- management :- Usually self limiting
 - If progressive → Transarterial embolisation

Bilhemia

- Transit of bile into blood circulation
- Fistula between biliary tree and vein
- Clinical features: Rapidly progressive jaundice
- Conditions: Post trauma
 - interventions
- · IOC : ERCP
- management: ERCP and stenting or Embolisation

Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with Marrow Edition 4 videos.

Congenital portosystemic shunts

01:04:49

Abernethy malformations

IOC: CT Angiography Types 1: Complete 11: Partial → Cirrhosis → Encephalopathy → Encephalopathy → focal nodular hyperplasia management: Transplant management: Embolisation

BARIATRIC SURGERY

Bariatric surgery

00:00:20

Indications

- 1. BMI more than 40 kg/ma
- a. BMI more than 35 kg/ma with obesity related complication.
 - om type 11
 - Hypertension
 - CAD
 - osteoarthritis
 - obstructive sleep apnea (OSA)
 (Pickwickian syndrome)
- Patient who fails to lose weight despite lifestyle changes, pharmacotherapy and psychotherapy
- 4. for Asian population:
 - more than 37.5 kg/m²
 - more than 32.5 kg/m² with complications
- 5. Patient is motivated to carry out dietary changes after surgery
- 6. Patient should be on a liver shrinkage diet at least 2 weeks before surgery.
 - → Low carbohydrate.
 - → High protein
- 7. Cessation of smoking
- 8. Chest physiotherapy encouraged
- 9. Patient's with Obstructive Sleep Apnea (OSA) should be given oxygen
- → OSA → independent risk factor for anastomatic leak.

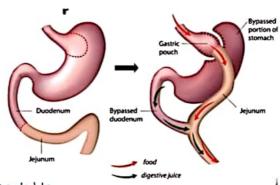
Risk factors	points	
- Arterial hypertension	1	
- Age more than 45	i,	-
- male gender	ĺ	
- Body mass index more than equal to 50 kg/ma	1	
- Risk factor for pulmonary thromboembolism	1	

Risk group	score	post - operative mortality
A (low risk)	0-1	0.3
B (moderate risk)	a-3	1.7
c (high risk)	4-5	3.a

- Another score Edmonton score
 Older technique
- Biliopancreatic division (BPD)
 - ightarrow gastric pouch , gastroileal anastomosis .
 - → 50 cm of tract for food 9 bile
 - ↑ malabsorption
- · duodenal switch variant (DS)
 - → sleeve
 - → 100 cm of tract for food & bile
- BPD and DS → max weight loss
 maximum resolution of obesity related complications
 But maximum surgical complication
 not done these days.

Roux -EN Y gastric bypass (RNY)

00:12:55



- most acceptable
 - → Roux limb length 75 150 cm
 - → Longer roux limb → more weight loss
- very obese patient → 150 cm

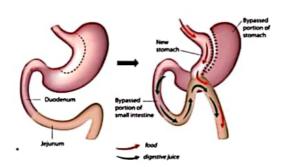
complication:

- Nutrition → Iron deficiency (m.c)
 vitamin B12 ↓
 calcium ↓
- a. Anastomatic leak.

 mc cause of mortality after bariatric surgery → pulmonary embolism

Mini gastric bypass

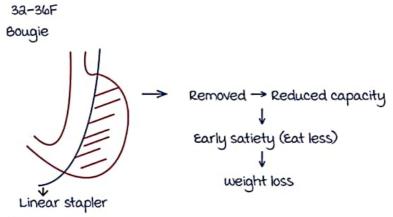
JU.17:50



- single anastomosis bypass.

Purely restrictive surgeries

- most commonly performed bariatric surgery
- Lap sleeve gastrectomy



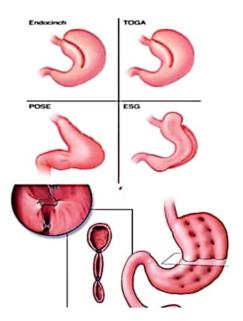
complication:

- 1. most common → Bleeding from staple line
- a. most distressing -> Leak from angle of His
- 3. Nutritional complication
- 4. Re-distention of gastric pouch /sleeve.
 - → weight gain 1

 $ROSE \rightarrow Restorative obesity surgery endoluminally$

- Example of NOTES procedure.

POSE → primary obesity surgery endoluminally.



Restrictive

Lap adjustable gastric banding (LAGB)

- gastric band around 6 cm from GE junction
- subcutaneous injection port in umbilicus

Deflate balloon again -> Restriction goes away

Hungry again → weight gain

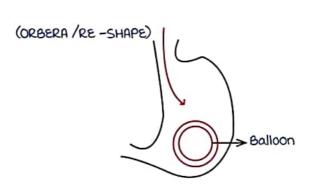
Reversible bariatric surgery

complications of LAGB :-

- 1. Nutritional
- a. DVT / pulmonary embolism
- 3. most common prolapse
- 4. Band can erode through stomach
- 5. Rupture

Intragastric balloon placement

00:34:58



- · Reversible bariatric surgery procedure .
- · No scars.

metabolic surgery → Better name for bariatric surgery

malabsorption ,percent excess weight loss (EWL) and diabetes remission after bariatric surgery protein/caloric 3-year HTN Hyperlipidemia 3-year% malabsorption % EWL diabetes remission remission gastric 15-20% 20-25% band 40-50% 20% No gastric bypass 50% 35-40% 55-60% No 50-60% sleeve gastrectomy No 50-60% 50% 35-40% 55-60% yes (max)70% BPD/DS 70% 70% 40-45% 70%

368

OXM: Oxyntomodulin, CCK: Cholecystokinin; PYY: Peptide tyrosine tyrosine, GIP: Gastric inhibitory polypeptide, GLP-1: Glucagon like peptide-1, SG: Sleeve Gastrectomy, AGB: Adjustable gastric banding, RYGB: Roux-en-Y gastric bypass, BPD: Bilio-pancreatic diversion, BPD-DS: Biliopancreatic diversion with duodenal switch

Bile acid Increased Not known Increased Not known Not known

Follow up after bariatric surgery is very important

- → Intially → 3 monthly
- → After a years → 6 monthly /yearly

MINIMALLY INVASIVE SURGERY

Advantages:

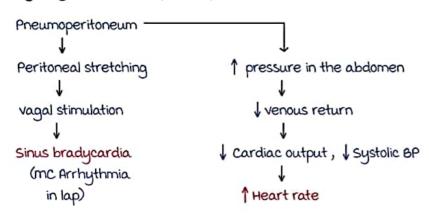
- Cosmetically better
- Faster recovery
- · Early return to activity
- · Pain
- Better visualization
- · The basic principles of minimally Invasive Surgery (MIS)
 - 1 Insufflate
 - V Visualise
 - 1 Identify
 - T Triangulation Improve efficiency, more ergonomic design.
 - R Retract the tissue while operating
 - 0 Operation
 - S Seal

Pneumoperitoneum

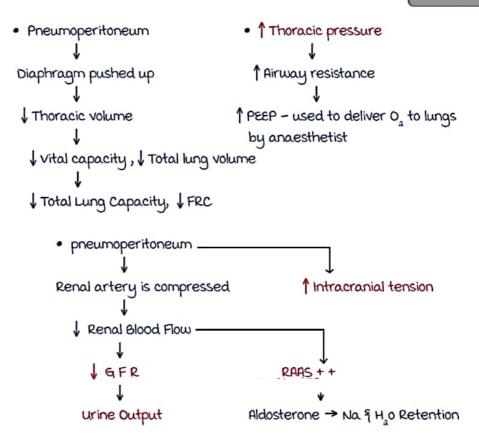
00:03:36

- Gas used: CO₂
- O₂9 Air not used -because both are combustible gases.
- pressure achieved : 10 -14 mmHg For abdominal surgeries 5 8 mmHg For mediastinal surgeries

Physiological effects of pneumoperitoneum:

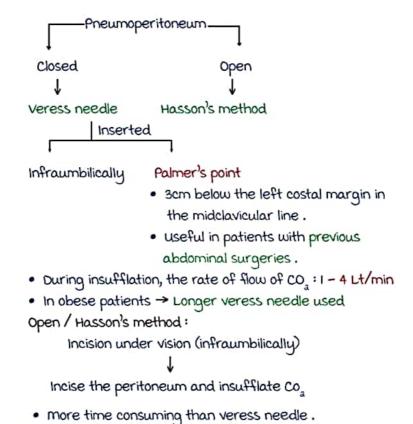


Prolonged surgery → CO₂ gets absorbed → Acidosis



Creation of pneumoperitoneum

00:10:59



Useful in patients with previous surgeries / adhesions









 Only the first trochar is inserted blindly, all the other trochars inserted under vision.

 If there is trochar injury to the bowel Immediately convert it into a open surgery keep the trochar in the same position to locate the site of injury.

Optiport / Visiport: End of it is transparent

Even the first trochar can be inserted under vision

Incidence of bowel injury 1

 Useful in - Adhesions of previous surgery. - Obese patients



Laparoscopic instruments

00:22:40

 Black coating around the instruments

Insulation: prevents current leakage

· If insulation breaks



Current leaks out and passes to trochar

1

As trochar is metallic, it passes the current and it burns the abdominal walls .

This is known as Capacitance

To prevent capacitance : proper insulation.

: use completely plastic trochars

Capacitance coupling / Direct coupling:

- If one instrument carrying the current is in contact with the other instrument which is in contact with the bowel, this leads to passage of current from one instrument to the other end resulting in burning of bowel.
- Triangulation helps to prevent this.

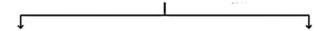
Problems of laparoscopy

00:28:14

- Time consuming
- · Control of bleeding is difficult.
 - If there is bleeding from the operative site

Apply pressure to the site of bleeding using gauze Topical Hemostats - Surgicell , Botroclot

If there is bleeding from trochar site



Elongate the incision and do direct control of bleeding

Insert a Foley's through trochar site and inflate balloon

- · aD vision
- · Loss of tactile feedback.

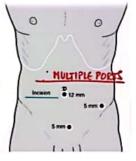
Conventional laparoscopy

00:32:46

multiple ports are used.
 Eg: Lap cholecystectomy - 4 Ports
 Lap appendectomy - 3 ports

SILS:

Single Incision Laparoscopic Surgery
 One port inserted by 15 mm



Active spa

Infraumbilical incision (3 ports)

- Cosmetically better
- A/K/A Single Port Access Surgery

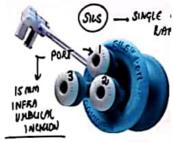
Disadvantages:

High rate of incisional hernia

Hand assisted laparoscopic surgery:

 A port to insert hand without leakage of gases

Prevents the problem of loss of tactile feedback





Notes:

- Natural Orifice Transluminal Endoscopic Surgery.
- · Oral cavity
- Rectum
- Bladder

Can be used as ports to carry out surgery

- Vagina / Uterus
- No incision on abdomen.
- Oral cavity → POEM Per Oral Endoscopic myotomy (Done for Achalasia)
 - Cystogastrostomy
 - TOGA TransOral Gastroplasty
 - ROSE Restorative Obesity Surgery endoluminal
 - POSE Primary Obesity Surgery Endoluminal.
- Rectum → TaTme Trans anal Total mesorectal excision.
- Bladder → Varicocele surgery Umbilicus instead not used in notes.

Robotic Surgery

00:40:56

- Da Vinci Robotic Systems are used.
- Works on the principle of master and slave concept.

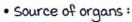
Advantages:

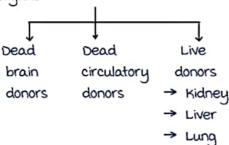
- Tremor reduction.
- 3D Vision
- more freedom of movement 7 Degrees of freedom
- → Better dissection and fine suturing.
- Scaling of movement

Disadvantages:

- Very expensive
- Longer learning curve.
- · Loss of tactile feedback.

TRANSPLANT SURGERY





Maastricht classification and organ stage

00:02:40

Maastricht classification	Presentation of death	DCD situation	Organs procurable
1	Dead on arrival	Uncontrolled	Tissue (heart valves, cornea)
11	Unsuccessful resuscitation	Uncontrolled	Kidney
III	Anticipated cardiac arrest	Controlled	All organs except heart
IV	Cardiac arrest in brain dead donor	Controlled	All organs except heart
V	Unexpected cardiac arrest in a hospital inpatient	Uncontrolled	All organs except heart

In type II maastricht classification, organs procurable are:
 Kidneys + tissue (heart valves, Cornea)

Organ storage

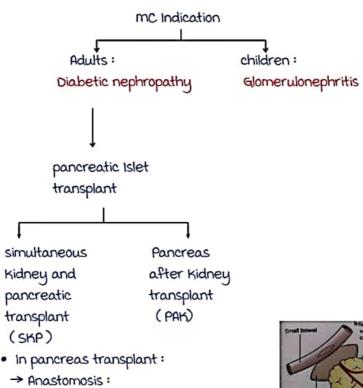
- · organs are stored in Uw solution (university of wisconsin)
- · stored in double / triple plastic bags
- Kept in solution at 4°c
- · Key constituents of UW solution:
 - → Adenosine → energy
 - → Glutathione
 - → Allopurinol free radical scavengers
 - → Lactobionase → stabiliser
- Each organ has its own cold ischemia time
 (maximum period for which the organ can be kept in solution)
 - → maximum and optimal cold storage times (appropriate

organ	optimum (hours)	safe maximum (hours)
→ kidney	< 18	36 (maximum)
→ Liver	< 1a	18
→ Pancreas	< 10	18
→ Small intestine	< 4	6
→ Heart	<3 (Least)	6
→ Lung	<3	8

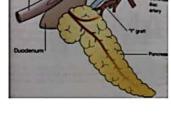
(Assuming zero warm ischaemic time and organs obtained from a non - marginal donor)

Renal Transplant

00:08:28



- - Artery -> common iliac artery
 - vein → Inferior vena cava /liac vein
 - Exocrine secretions from pancreas



Duodenum Bladder

→ monitor graft function by urinary amylase

extended / expanded donor criterias for renal transplant:

→ A fit patient >60 years

O

- >50 years with a or more:
- Death due to stroke
- History of hypertension
- serum creatinine > 1.5 mg/dL
- o Kidneys which are harvested from marginal donors o slightly poor outcome compared to Kidneys from healthy donors .
- Left Kidney:
 - → Preferred donor Kidney
 - → Longer renal vein
- Investigations carried out in a Donor.
 - 1. ABO compatibility
 - a. Rh compatibility: Not very important
 - 3. HLA compatibility
 - → most important HLA: DR > B > A
 - 4. Kidney function Test
 - 5. USG KUB
 - 6. Rule out infections
 - 7. Renal isotope scan
 - → function: mAG 3

(Total and differential renal function)

· In a recipient

Orthtopic

→ Graft at same anatomical location Heterotopic

→ Different Location

- preferred in Renal Transplant

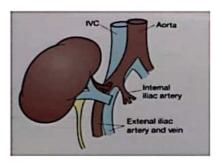
- Kidney placed in Iliac fossa.

→ In case of a dead donor, a path of aorta is taken along with renal Artery



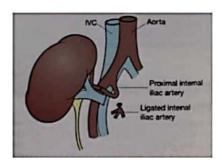
Anastomosis (Dead donor):

- Renal Artery → End to side with external iliac artery
- Renal vein → End to side with external iliac vein
- -> Gregor ISH technique ureter → Bladder – Lead better politano technique



Anastomosis (Live Donor)

Renal Artery → End to End fashion with internal iliac artery.



Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with marrow Edition 4 videos.

Complications of renal transplant : rejection

00:21:14

1. Rejection

- → Loss of function and histological changes (BANFF Classification)
- → Biopsies of organs:
 - Kidney, Liver -> Needle biopsy
 - Bowel -> Endoscopic mucosal biopsy
 - Heart ___ subendocardial biopsy (Jugular vein)



Other complications of renal transplant

00:30:48

- Infection
 - -> maximum incidence: within 6 months
 - → first month: Bacterial infections more common
 - → overall: viral infections are more common
 - → mc organism : cmv
 - → B.K virus can infect kidney transplant patients
 - → In India: TB is also common in Kidney transplant patients
- malignancy
 - → mc: skin cancer (squamous cell carcinomas)
- PTLD (Post Transplant Lymphoproliferative Disorder)
 - → EBV
 - → High mortality rate

- → B-cell mediated
- → presents as infectious mononucleosis
 - Lymphadenopathy
- -> common in children
- → CNS involvement → very poor prognosis
- Vasular
 - -> Renal vein thrombosis: more common
 - → Renal artery thrombosis
 - → Long term : Renal artery stenosis
- Delayed graft function
 - → Dialysis required after transplant
 - → >90% 1 year graft survival rate \ Kidney \ Liver
 - > 80% 5 year graft survial rate)

00:36:54

Heart transplants

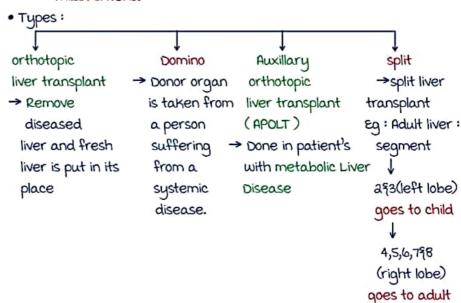
Liver transplant

Indications

Adults: children
cirrhosis Extra hepatic
(HCV > HBV) biliary atresia

- Before transplant following scores are checked.
 - → child pugh score (CTP)
 - → model for end stage liver disease score (MELD)
 - → Pediatric end stage liver disease (PELD)
- · HLA matching is not important
- HCC patients can get transplants
 provided they meet

milan criteria



- · Sequence of anastomosis:
 - 1. suprahepatic IVC
 - a. Infrahepatic IVC
 - 3. Portal vein
 - 4. Hepatic artery
 - 5. Bile duct
- King's college criteria for transplant in patients with Acute Liver Failure.

Acetaminophen-induced ALF	Nonacetaminophen-induced
Arterial pH <7.30 after fluid resuscitation	Prothrombin time > 100 sec (INR >6.5)
Or all of the following: Prothrombin time >100 sec (INR >6.5) Serum creatinine >3.4 mg/dL Grade 3 or 4 hepatic encephalopathy	Or any 3 of the following: Non-A, non-B viral hepatitis, drug-induced or indeterminate etiology of ALF Time from jaundice→ encephalopathy >7 days Age <10 years or >40 years Prothrombin time >50 sec (INR >3.5) Serum bilirubin >17.4 mg/dL

· complications:



- a. Infections
- 3. malignancy
- 4. PTLD
- 5. MC vascular complication: Hepatic artery thrombosis

→ sudden decline in LFT

L. majority require retransplant.

6. Biliary strictures.

Heart transplant, lung transplant and GVHD

00:48:00

Active space

Heart Transplant:

· Sequence of anastomosis:

Left atrium > Right atrium > Pulmonary Artery > Aorta

Pulmonary / Lung transplant

6

Isolated

Combined Heart and Lung

→ Postero - lateral thoracotomy

Anastomosis:

 Pulmonary vein along with a cuff of left atrium (Donor)

Left atrium (Recipient)

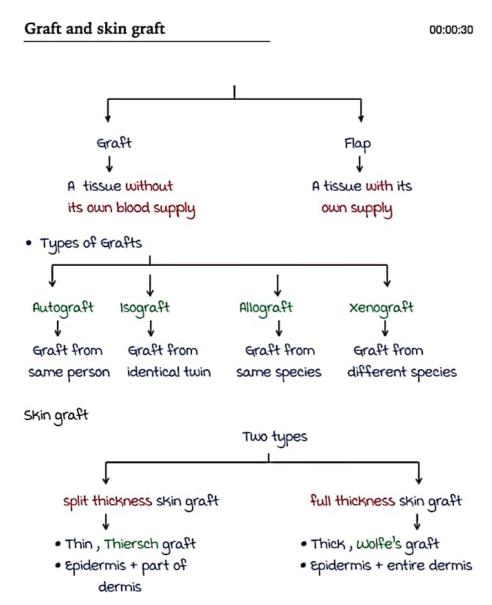
- a. Bronchial anastomosis
- 3. pulmonary artery anastomosis

GVHD (Graft vs host disease)

- small intestine transplant (active lymphocytes)
- Typical rash on palm / sole
- GI dysfunction
- · Liver abnormalities .



PLASTIC SURGERY, WOUNDS AND CLEFT LIP

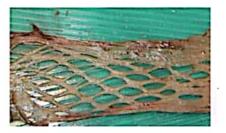


split - thickness	Full - thickness
 m.C donor site – thigh > buttocks The skin graft is raised using 	 m.C donor site -postauricular skin ,supra/infra clavicular fossa
Humby Knife Electric dermatome	axillary skin is never used
If punctate hemorrhage points are seen when graft is raised	Suture the donor siteDonor site cannot be reused
indicates right thickness of the graft	 primary contracture amount of dermis ↓
 After raising graft → meshing/ scoring of graft is done 	The graft shrinks immediately after cutting it
 i) 1 surface area-1.5 times ii) Prevents fluid accumulation beneath the graft 	↑↑with full thickness graft
 Only dressing is required Donor site can be reused later Secondary contracture inversely propertional amount of dermis The graft shrinks after it is placed on recipient site inversely propertional The graft shrinks after it is placed on recipient site inversely propertional inversely propertional inversely propertional inversely propertional The graft shrinks after it is placed on recipient site inversely propertional inversely pr	

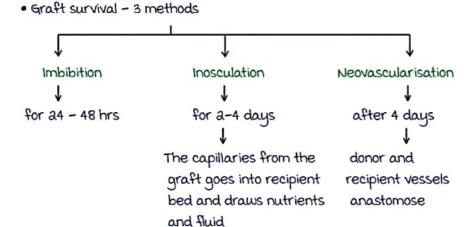
Plastic Surgery

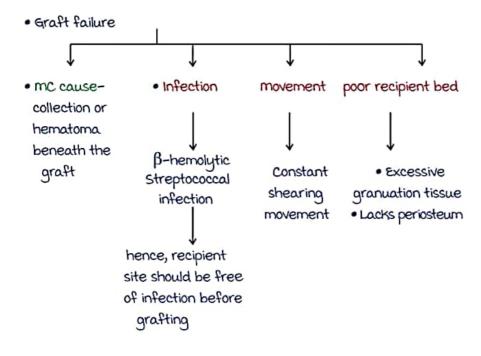
Humby Knife Electric Denmatorne

Skin Grafts



Split-thickness skin graft (STSG)	Full thickness graft
• Survival / take up- better	 More resistant to trauma
• Uses- in burns patients	 Cosmetically better (Colour matching is better)
 In skin banks-STSG can be 	, 0
Stored for a-3 weeks at 4°C	

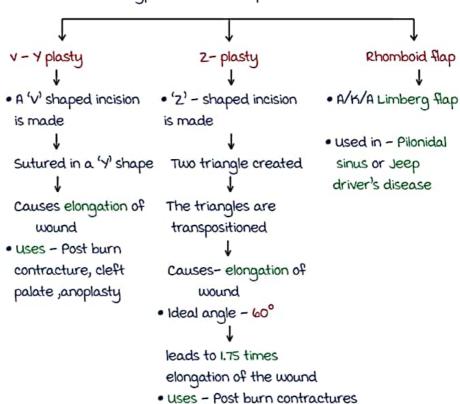


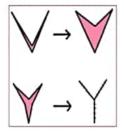


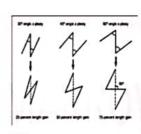
- · The flap is rotated but not based on named blood vessel.
- . The length to width ratio

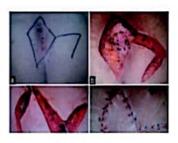
Ideal - 1.5:1 (maximum - 3:1 → 1 risk of failure)

Types of random flap









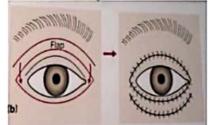
V- plasty

2- plasty

Rhomboid Flap

- · Bilobed flap
 - · For tip of nose reconstruction
 - E.q -in basal cell carcinoma over tip of the nose
- · Bipedicled flap
 - For eyelid reconstruction





Flaps - axial flaps

00:22:38

- The flap is rotated on a named blood vessel
- · In head and neck reconstruction.

i) mc used - Pmmc flap (Pectoralis major myocutaneous flap) Incision given on pectoralis major (medially) The pedicle - pectoral branch of thoracoacromial artery

the flap is lifted and Swung up on the pedicle



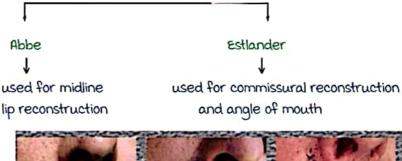
ii) Deltopectoral flap

The blood supply is from - perforators of internal mammary vessels

Incision given laterally over the muscle lift the muscle medially and swing it up



- · A/K/A Lip switch flap
- · blood supply Labial vessels
- Two components





Flap- axial flaps - breast reconstruction

00:26:56

Breast reconstruction

· Latissimus dorsi flap

The latissimus dorsi muscle is dissected and is placed anteriorly to do breast reconstruction.



TRAM flap - mc used for breast reconstruction

Transverse rectus abdominis myocutaneous flap

An elliptical incision over the lower abdomen

blood supply - Superior epigastric vessels

muscle moved up & reconstruct the breast

- Disadvantage ↑ abdominal wall weakness
- · Free TRAM

Blood supply - Inferior epigastric vessels

• TRAM flap + free TRAM flap - Super charged TRAM



Flaps - free flap

00:30:45

- Disconnected from donor site and microvascular anastomosis done at recipient site.
- DIEP flap Deep inferior epigastric artery perforator flap

Elliptical incision over the lower abdomen

Skin and fat is dissected, muscle is not dissected

microvascular anastomosis to axillary vessels

Breast reconstruction.

DIEP flap - best method for breast reconstruction.

Head and neck free flap reconstruction

- Free fibular flap mc for mandibular reconstruction based on peroneal vessel.
 - Also used for Andy Gump deformity
- Radial artery forearm falp.



Radial artery flap



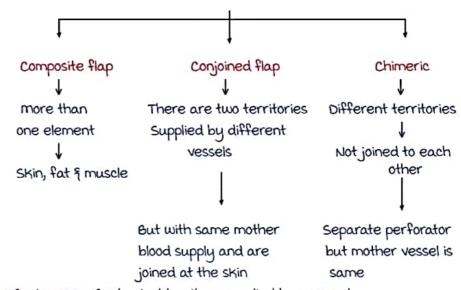
Free fibular flap



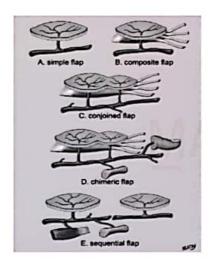
→ Pedicled / Island flap

Flaps - composite, conjoined, chimeric

00:36:38



Angiosome - Anatomical territory supplied by a vessel



- Occurs due continuous

 in pressure
- · Pressure > 30 mm Hq
- · mc site Ischium

Staging of Bed sore

Stage 1 - Non- blanchable erythema without a breach in the epidermis

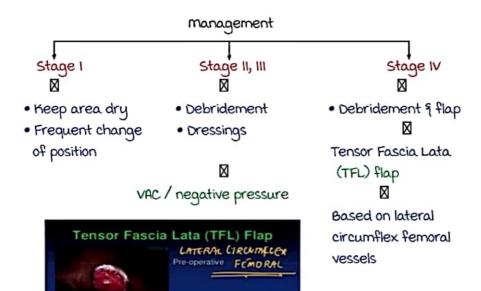
- Stage a Partial -thickness skin loss involving the epidermis and dermis
- Stage 3 Full thickness skin loss extending into the subcutaneous tissue but not through underlying fascia
- Stage 4 Full thickness skin loss through fascia with extensive tissue destruction, may be involving muscle, bone, tendon or joint .

Pressure sore frequency in descending order

- Ischium
- Greater trochanter
- Sacrum
- · Heel
- malleolus (lateral then medial)

Post-operative

Occiput



- Keep area dry
- Frequent change of position

For bed bound patient

For wheel chair bound patient

every a hrs

Lifted for atleast 10 sec every 10 mins

- Air / water mattress
- Provide good nutrition

Dressings

00:47:02



Alginates & foam

Hydrocollold 9 Hydrogel

Collagen

- Highly absorbent
- Occlusive, water proof
- Non infective wound
- Used for- Exudative
 But cannot absorb wounds
 - Uses-clean wound
- (because collagenases are released in
- e.q- Duoderm dressing
- infective wound)
- · In burns if wound is clean
- · use-burns

Vaccum Assisted Closure (VAC)

- Negative pressure dressing
- An occlusive dressing is place over the sore

It is connected to VAC-generates - 125 mm Hg of pressure

Sucks exudate (wound healing)

uses

- 1) Chronic non healing wounds
- a) venous ulcer (without slough)
- 3) Diabetic ulcer (without osteomyelitis)
- 4) Burns wound (without eschar)
- 5) Bed sore





Tegaderm

- transparent film dressing / opsite
- · Occlusive, water proof dressing
- Can see through the dressing Steri strips
- Paper strips
- used when needle scar by suturing is not preferred
- · used for approximation of skin edges

Tissue glue

- cyanoacrylate
- used for approximation of skin edges in lobuloplasty





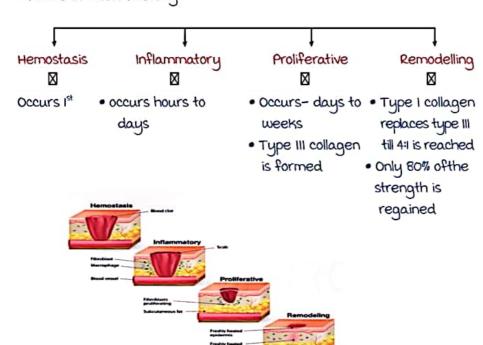
Tegaderm

Steristrips

Wound healing

00:55:51

Phase of wound healing



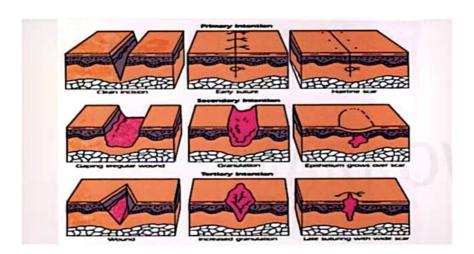
Keloids and hypertrophic Scar

Keloid	Hypertrophic Scars
 MC site- Sternum, earlobule Shoulder Racial -Dark skinned people Don't subside with time and pressure Raised, red & itchy Grow beyond the boundry of the scar Management- intralesional Triamcinolone 	 In extensor Surface Common in Children Grow within the boundry of the scar and subside with time f pressure use of silicone pad/ gels – chances for scar formation



Wound healing by primary, secondary, tertiary intention

01:01:42



Primary intention

better

scar formation

Secondary intention

- more wound contracture
- † granulation tissue

tertiary intention

- Delayed primary closure
- Initially wound is left open f dressing done
 once infection subsides f granulation tissue formation occurs

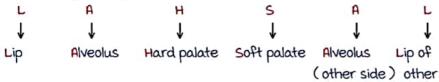
Resuture the wound

Cleft lip and cleft palate

01:03:49

- · Seen in 1 in 600 live birth
- · males > Females
- · mc defects combined lip + palate
- Risk factors Environmental Maternal epilepsy, drug during pregnancy - Phenytoin, Steroids, Strong genetic predispositoin
- Associated with Pierre Robin syndrome
 - Retrognathia
 - Posterior displaced tongue
 - Isolated cleft palate

Documenting cleft lip and cleft palate



side

- · Capital- 'L' . donates Complete cleft
- Lower case- '1' denotes partial cleft
- · e.g La sa

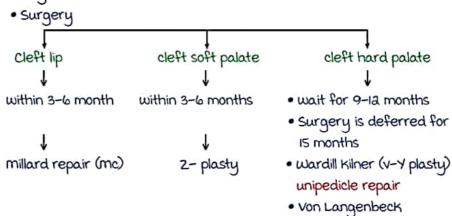
complete lip, partial alveolus on same side, partial soft palate, partial alveolus on other side

Cleft lip and cleft palate - problems and management 01:08:17

Problems

- 1) Cosmetic
- a) Speech abnormalities
- 3) Difficulty in feeding
- 4) In cleft palate 1 incidence of middle ear infections

management



Complication of Surgery

- 1) Hemorrhage
- a) Infection
- 3) malaligned cupid's bow



Bipedicle repair

Require resurgery

- 4) velopharyngeal insufficiency- (the palate moves like a flap)
 - Causes speech abnormalities
 - Require resurgery
- If all three abnormalities are present in a child

1st surgery at 3-6 months-repair cleft lip 9 soft palate and Surgery at 9-12 months-repair cleft hard palate

Tissue expander

 used to expand a contracted tissue, after expanding enough, an implant is placed eq-for breast reconstruction



NEUROSURGERY

Tumors in neurosurgery

00:01:07

- · mc brain tumor: metastasis.
- mc organ metastasizing to brain: Lungs (to cerebral hemispheres).
- mc cancer which metastasizes to leptomeninges: Breast.
- Features: Headache, seizures, focal neurological signs.
- · IOC: MRI with Gadolinium contrast.

Management of brain metastasis

00:03:54

- Intracranial tension: Steroids (vasogenic cerebral edema)
- Surgery: For solitary brain metastasis → whole brain radiotherapy
 L WBRT]
- Stereotactic radiosurgery / Gamma Knife / Cyber Knife: multiple precisely directed beams of radiotherapy to tumor (less collateral damage)
- Chemotherapy not useful, except in Seminomas, small cell lung Ca.
- MC primary brain tumor: meningioma > Gliomas
- mc primary brain tumor in children: medulloblastoma

Glial tumors - types

00:09:07

- Astrocytoma, oligodendroglioma, ependymoma.
- Astrocytoma : Adults : Supra tentorial
 Children : infra tentorial

mc posterior fossa tumors in children

WHO Classification of astrocytomas

00:11:01

- · Grade 1: Pilocytic astrocytoma:
 - As a mural nodule, no infiltration;
 - mc astrocytoma in children; Low grade → .. Best prognosis
 - Diagnosis: mRI -discrete, contrast enhancing cystic lesion with a mural nodule.
 - management : Surgical excision .

 Grade 11: Low grade, diffuse astrocytoma: In children/young adults. Nuclear atypia, low cellularity (+); Present with seizures. If low grade, P16 / CDKNAA mutated → Converts to high grade tumor.

> Diagnosis: MRI management: Surgery followed by WBRT.

 Grade III: Anaplastic astrocytoma: Present with seizures, personality changes - if in frontal lobe. Diagnosis: MRI - irregular enhancing lesion. management: Surgery followed by external beam radiotherapy (EBRT) (brain RT)

 Grade IV: Glioblastoma multiforme (GBM): most aggressive, crosses midline sometimes [... Butterfly tumor]. Common in elderly, seizures (+) HPE: necrosis (+), Pseudopalisading pattern (+) MRI: Ring enhancement with central necrosis. management: Surgery followed by EBRT. Oral Temozolomide has improved survival in GBM patients.

Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with marrow Edition 4 videos.

Oligodendroglioma

00:21:17

- Loss of heterozygosity on Chromosome 19q > Ip [If this mutation (+); good response to Temozolomide]
- In white matter frontal lobe. Presents with seizures.
- Diagnosis: mRI: Shows calcifications.
- Brain tumors showing calcifications on MRI: craniopharyngioma (mc) > Oligodendroglioma > meningioma.
- HPE in oligodendroglioma: Fried egg cytoplasm

(: halo around nucleus)

Chicken wire vascularities.

microscopic calcifications.

management: Surgery followed by chemotherapy.

Chemotherapy:- Procarbazine

Lomustine

Vincristine

- Oral Temozolomide (mutations have good prognosis)

- mc: myxopapillary ependymoma [from filum terminale of spinal cord]
- Present with hydrocephalus
- · Can spread via CSF.
- MRI: Diffusely enhancing mass.
- HPE: Pseudo-rosettes
- management : Surgical followed by EBRT
 If CSF spread ⊕ → Craniospinal radiation given

Meningioma

00:29:17

- Arise from meningeal cells/ arachnoid cap cells.
- mc primary brain tumor, in adults [female > male]
- Slow growing, well encapsulated.
- · Intra cranial, extra axial, dural based
- Diagnosis: MRI, HPE Psammoma bodies
- Chromosome aa mutation
- Express progesterone receptors : 1 growth during pregnancy
- · management : Surgical excision

Primary CNS lymphoma

00:32:44

- Usually Non-Hodgkins lymphomas ↑ incidence ∴ HIV/AIDS and transplant recipients
- Features : seizures, ↑ICT
- Called Ghost cell tumors: partial, quick resolution of tumor with steroids
- Diagnosis: Stereotactic biopsy
- management: steroids,
 Chemotherapy methotrexate (intra thecal), Cytarabine; EBRT

Medulloblastoma

00:35:27

- mc primary brain tumor in children.
- 3-4 yrs age mainly.
- Can be associated with Turcot syndrome (variant of FAP syndrome):
 APC mutation.
- Highly malignant, usually infra tentorial and present in cerebellum
 In children tend to occur in vermis present with 1 ICT.

- Exhibit Drop metastasis through CSF
 metastasis outside brain: Bone, liver, lymph nodes
- · Diagnosis: MRI
- management: Surgery, highly radio sensitive
 Chemotherapy: Carmustine and Vincristine.

Syndromes in Neurosurgery

00:38:50

- NFI 17q: Neuroma, Schwannoma, Optic glioma, meningioma
- NF a aaq: Schwannoma, Glioma, Ependymoma
- Li fraumeni syndrome p53: 17p malignant gliomas
- Turcot syndrome APC: 5q: medulloblastomas
- men 1 11q: Pituitary adenoma
- VHL 3p: Hemangioblastoma of retina
 Pheochromocytoma

Acoustic Neuroma

00:42:20

- mc involves interior vestibular nerve > superior vestibular nerve
- · Situation: At CPA [Cerebellopontine angle] commonly
- · Benian, encapsulated, slow growing
- Features: Unilateral sensorineural hearing loss (SNHL) with tinnitus (MC) VII, X, XI cranial nerve involvement
- · Diagnosis: MRI
- management: Surgery
- mc spinal tumors: metastasis
- MC primary spinal tumor: Nerve sheath tumors
- mc intra medullary tumor: Astrocytoma
- mc location of spinal tumors: Intradural extramedullary
- Tumors that can "spread through CSF": Pinealoblastomas

CNS lymphomas medulioblastoma Germ cell tumors

Herniation syndromes

 A) Uncal (lat transtentorial): Ipsi CN III palsy ("blown" pupil) + contra hemiplegia/posturing (Kernohan notch phenomenon)

temporal lobe mass → medial temporal lobe under tent, cerebelli

B) Central transtentorial: Coma + b/l small pupils → decorticate → decerebrate posturing + rostral → caudal loss brainstem reflexes

diffuse cerebral edema → ↓ displacement diencephalon

- C) Subfalcine: Coma + contra. weakness → posturing esp leg ± ACA stroke frontal/parietal mass → cingulate gyrus under falx
- D) Cerebellar (↑ or ↓): Cerebellar Si/Sx + medullary dysfxn → coma + b/l posturing

Meningocele

00:52:18

- Posterior vertebral arch defect
- Herniation of meninges, but spinal cord is normal. Can be associated with tethering of spinal cord
- Features: Fluctuant mass, is "brilliantly transilluminant"; Commonly situated in lower back and well covered by skin
- · Diagnosis : X-ray
- management: If skin cover intact, patient normal: Delayed surgery.
 If CSF leak⊕: Immediate surgery.
 If spinal cord tethering⊕: Detether the cord.

Spina bifida occulta

00:55:45

- Occult spina bifida. Sometimes tuft of hair at site ⊕
- · Incidental finding.
- · If patient normal: No intervention required

Meningomyelocele

00:56:48

- Severe neural tube defect meninges and cord both herniate out.
- Genetic predisposition: If one child affected 5% higher risk
 If two children affected 10% higher risk
- · Folate deficiency in mother .
- Women on trimethoprim, phenytoin, phenobarbitone, valproic acid are at higher risk of developing neural tube defect
- mc location : lumbo sacral region .

- If in sacral region child can have bowel and bladder incontinence,
 anesthesia in perianal region
- If in mid lumbar region Paraplegia
- management :- Surgery
 - Even after surgery, residual neurological deficits may persist.

Arnold chiari malformation

01:01:30

Chiari I	Chiari II
- Displacement of cerebellar ton- sils (>5mm) into cervical canal - In adult life	- Elongation of hind brain and Kinking of brain stem
- Not associated with hydroceph-	- Hydrocephalus +
- Neck pain and spasticity + - Syringomyelia +	- X-ray: Small posterior fossa, widened cervical conal. - Management: Surgical decom- pression-hydrocephalus correction

Dandy walker malformation

01:05:20

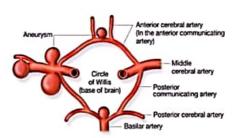
- Cystic 4th ventricle expansion and midline cerebellar hypoplasia
- Triad hypoplasia of vermis
 - Enlarged posterior fossa
 - Rotation of vermis and dilatation of 4th ventricle.
- mc posterior fossa malformation
- Features: macrocephaly (mc), Hydrocephalus, ataxia, delayed motor development
- . 10C : MRI
- management: Treat hydrocephalus (shunting);
 Poor prognosis.

Berry aneurysm

01:08:35

- · Saccular aneurysms
- Pre disposing factor: HTN, smoking
- † risk in : Adult polycystic kidney disease, marfan's syndrome,
 Ehler Danlos syndrome
- multiple (a0-30%)
- mc location: Junction of anterior cerebral artery and anterior communicating artery [30%]

- · Wall:
 - Thickened hyalinized intima
- Usually rupture at apex.
- Cause both sub arachnoid and intra - Parenchymal hemorrhoges.



Sub arachnoid hemorrhage (SAH)

01:12:09

- Spontaneous SAH: Features:
 - Severe excruciating head ache / worst headache of life / Thunderclap head ache.
 - Transient loss of consciousness
 - Vomiting and neck stiffness
 - Focal neurological signs usually "absent"
- Terson syndrome: SAH + vitreous hemorrhage
- mcA aneurysm : Pain behind the eye
- Aneurysm at TCA and ICA junction: 3rd nerve palsy
- · Inferior cerebellar artery: Occipital and posterior cervical pain.

WFNS grading of SAH

01:16:20

WFNS [World Federation of Neurosurgical Societies]:

Grade	ecs	Focal deficits
0	15	-
(I)	13 - 14	-
(II)	13 - 14	+
(IV)	7-1a	+/-
(v)	3-9	+

Hunt - Hess Scale - SAH

01:18:16

- Grade 1: Mild headache, normal mental status
- · Grade a : Severe headache, normal mental status
- Grade 3: Confused, mild motor deficit
- Grade 4 : Stupor, moderate severe motor deficit
- · Grade 5 : Coma

0

Diagnosis of SAH: NCCT (early)
 If late presentation: CSF tap - xanthochromia (+)

- management of SAH: surgery
 Clipping of aneurysm [or]
 Angiographic coiling
 Shunt surgery
- Complications post surgery:
 - Re-bleeding
 - Hydrocephalus (usually communicating)
 - Delayed ischemic Neurologic deficit [DIND]:

3-10 days post-surgery

Can progress to infarction if not managed early. Nimodipine can be used to prevent vasospasm.

Triple H therapy - SAH

01:23:50

- Hypervolemia
- Hemodilution
- Hypertension

PEDIATRIC SURGERY

Abdominal wall defects in children

00:00:24

Defect

Omphalocoele

- Defect through the Umbilicus
- Bowel remains outside q is covered by a peritoneal sac
- Bowel → malrotation (+)
- Cardiac defects (+)
- No viscera other than bowel is exposed
- A type of physiological hernia



Gastroschisis

- Defect adjacent to the umbilicus (Common on right side)
- Bowel → exposed (No sac covering the bowel)
- Bowel → exposed → dry → inflammed

Perforation

 liver → can be exposed as well

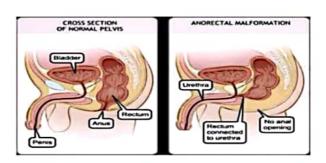


management of abdominal wall defects:

- D Look for other abnormalities.
- 11) Correct dehydration.
- 111) SILO -> made out of a mesh to cover the defect

Anorectal malformation

00:08:59



males:

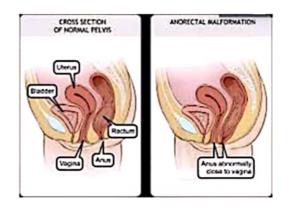
- No anal opening
- Fistula → between rectum § urinary tract.

Female:

Either fistula (+)

(or)

Anal 9 vaginal opening are close to each other



male

Rectovesical fistula

rectourethral fistula

Anal stenosis Rare malformations Female

rectovaginal fistula

- rectovestibular fistula
- rectovaginal fistula

Anal agenesis without fistula

Rare malformations

Intermediate

High

· Low

miscellaneous

Clinical features

- No anal opening
- Fistula(+)

Diagnosis of ano - rectal malformation

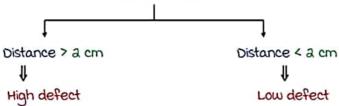
00:12:39

1. Invertogram

- Done after a4hrs [Time required for gas to reach lower part of rectum]



- Radio - opaque marker - placed on proposed anal opening site Distance between rectal bubble & Skin marker - measured



a. CT / mrl -> Provides better delineation of soft tissue

Rule out other congenital anomalies

- v vertebral defect
- A Anorectal defect
- C Cardiac defect
- Tracheo esophageal
- R Renal defect
- L Limb defect

Management of ano rectal malformations

00:15:57

- Classification given by Pena

Males	Female
Perineal fistula	Perineal fistula
Rectourethral fistula Bulbar Prostatic	Vestibular fistula
Rectovesical fistula	Persistent cloaca <3 cm common channel >3 cm common channel
Imperforate anus without fistula Rectal atresia	Imperforate anus without fistula Rectal atresia

- management:
 - Surgery → PSARP [posterior sagittal Anorectoplasty]

Low anomaly High anomaly

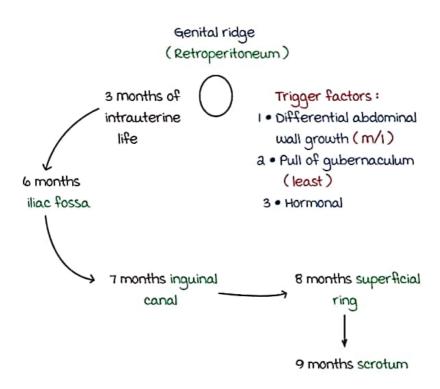
- Single stage PSARP
- a stage procedure
- [Colostomy initially] - Perineal approach
- Abdominal + perineal approach

- Complications of surgery
 - Fecal incontinence
 - Urinary incontinence

TESTICULAR DISORDERS

Undescended Testis

00:00:25



- Left testis descends earlier
- Preterm: higher incidence
- · Descent can occur: till 4-5 months after birth.

Incompletely descended / undescended

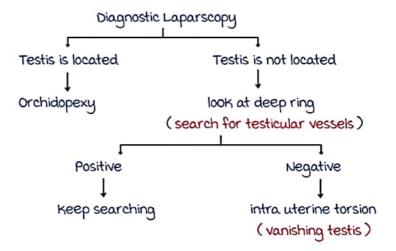
- Testis is arrested along normal path of descent
- If bilateral → cryptorchidism
- · Right > left
- m. C site → inquinal canal
- Changes:
- → J Volume
- → TRISK OF ITECN (intra tubular germ cell neoplasm)
- → Sertoli cell are more affected: → Spermatogenesis suffers
- → Leydig cells are affected less: → Testoterone normal

Normal secondary sexual features

- Higher the testis → ↑ Histological changes
- · Clinical features : -

On Examination: If inguinal testis \longrightarrow Palpate

If intraabdominal testis -> 10C: Diagnostic laparoscopy



Undescended testis: management and complications 00:11:25

- management : surgery
 Orchidopexy
- · Ideal time : 6-12 months
- Limiting factor: Length of testicular vessels
- Techniques:
- 1. Stephen Fowler technique
 - → a stage technique
 - First stage: High ligation of testicular vessels and bring testis in inquinal canal
 - → Second stage: Scrotum
- a. Keetley Torek Procedure
- 3. Silbar Procedure
 - → Best results
 - Disconnect testicular vessel and testis is brought to scrotum, microvascular anastomosis of vessels with branch of internal iliac vessel.

Complications

- mnemonic : Testis .
 - T → Torsion
 - $\epsilon \longrightarrow \epsilon pididymo-orchitis$
 - S → Sterility: orchidopexy doesn't reverse sterility
 - T→ Trauma
 - $1 \rightarrow \text{Indirect inguinal hernia} (m.c)$

1 46-9 times higher

→ Risk of cancer doesn't reduce with orchidopexy, but favours early detection.

Ectopic testis and retractile testis

00:17:01

Ectopic Testis

- Testis deviates from normal path of descent
- · m. C site: superficial inquinal pouch
- management : orchidopexy

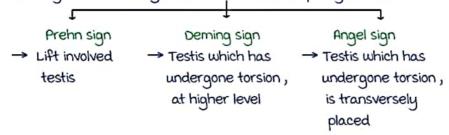
Retractile testis

- Normal variant
- Normally testis in scrotum, but occasionally testis jump into inguinal canal.
- management : Reassurance

Torsion

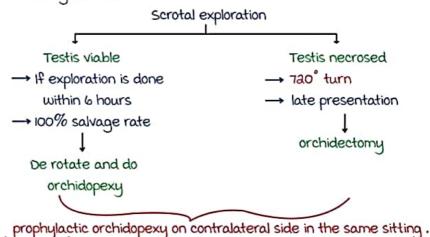
00:19:22

- · Risk factor:
- 1. Testicular inversion
- a. Bell clapper testis
- → ↑ investment of tunica vaginalis.
- 3. Undescended testis
- 4. Torsion of cyst of morgagni
 - → Same clinical features as torsion
 - → Blue dot sign
- · Clinical features:
 - → Young males
 - → Acute scrotal pain and swelling
 - → Differential diagnosis: acute epididymo-orchitis
 - → History of UTI
 - → Acute scrotal pain and swelling
- Clinically differentiating between torsion and epididymo-orchitis



Active space

- · Clinical diagnosis, supported by doppler
- management :



Epididymo-orchitis

00:29:21

Epididymo-orchitis:

- m. Corganism < 40 years : Chlamydia
- m. C organism > 40-45 years : E. coli (a° to uTI)
- Clinical features:
- \longrightarrow Differential diagnosis : Torsion
- management:
- → Antibiotics
- → Scrotal support

Spermatocele

- Unilocular swelling
- Involves epididymal head
- Sperm transport mechanism (cyst forms there)
- Barley coloured fluid
- sperm ⊕
- If patient is symptomatic

Excision

Epididymal cysts

- multiloculated
 - (Bunch of grapes)
- Cystic degeneration of epididymis
- Crystal clear fluid

(Brilliantly transilluminant)

(chinese lantern pattern)

 If patient is symptomatic:

Excision

→ But it can interfere with sperm transport

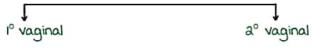


Scrotal sebaceous cyst management : Excision

Hydrocele 00:35:08

- · Accumulation of fluid tunica vaginalis.
- Types: vaginal : m.cHydrocele

vaginal hydrocele





→m.c overall

→ a° to →epididymo- orchitis (m.c

for a°)

→Trauma

Tumor

- → Defective absorption of fluid
- → Tense swelling
- →Testis is not palpable
- → Clear fluid (Transilluminant)
- → ↑ secretion of fluid
- lax swelling
- Testis is palpable
- → Turbid fluid



→ In a vaginal hydrocele, can get above swelling:

Scrotal swelling

Infantile hydrocele

- Extends till superficial ring
- Not able to get above swelling

Inquinoscrotal swelling



Infantile hydrocele

management: Eversion of Sac

Excision of excess sac

Encysted hydrocele of the cord

Cystic swelling along the cord

Congenital hydrocele

- patent processus vaginalis
- · have a hernial sac invariably
- management: Herniotomy (a-3 years of age)

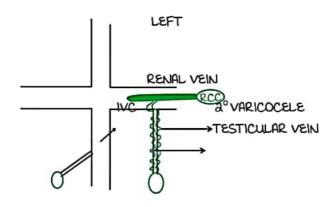


Congenital Hydrocele

Varicocele

00:44:12

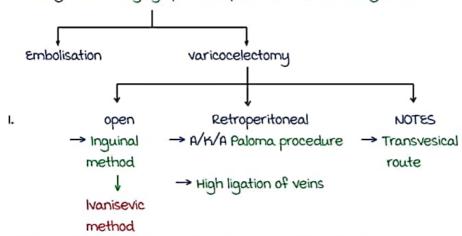
- Dilated tortuous pampiniform plexus of veins_
- · Common cause of male infertility
- · Left > Right :



- 1. Left testicular vein → longer
- a. Opens at right angles to renal vein
- 3. Sigmoid colon can press on left testicular vein
- 4. left adrenal vein opens opposite to opening of left testicular vein
- Normal scrotal temperature is a °C less than abdominal temperature
- When varicocele occurs →Scrotal temp ↑ ↑

Spermatogeneis suffer

- Clinical features: Asymptomatic
 Dull pain in scrotum
 swelling in scrotum
 Infertility
- . On examination: 'Bag of worms' consistency
- IOC : Doppler
- · Grading:
 - I → Impalpable, but positive on doppler
 - 11 → Palpable
 - III → Visible
- Management : Only symptomatic patients require management



NOTES - Natural Orifice Transluminal Endoscopic Surgery

- -high recurrence rate due to dual blood supply
- -only 20-30% patients show improvement in sperm count

Testicular tumors

00:54:17

- · m.c Testicular tumor :
 - → Children: Yolk sac tumor

- · Risk Factors :
 - → undescended testis (↑ risk by 6-9 times)
- · Clinical features:
 - → painless testicular mass (m.c.)
 - → Abdominal lumps (Retroperitoneal lymph node mass)
 - → Feminisation → Sertoli cell tumours
- -> masculinisation
 Precocious puberty Leydig cell tumors
 - → Cannon ball metastasis to lungs
 - → Hurricane → Rapidly progressive tumor choriocarcinoma
 - → median survival: 6 months
 - → CNS metastasis
 - → Spontaneous regression
- Diagnosis:

Imaging: CECT

Tumor markers : β hcq LDH AFP

→ Lot of times there is absence of a clear finding which indicates the presence of tumor

Suspecting Testicular
Tumor

Chivassu manoeuvre

→ High inguinal incision

Deliver the testis through the incision

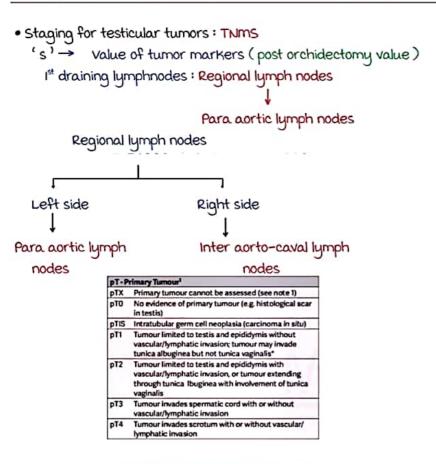
Soft clamp on cord, split testistand send frozen section.

Positive cancer
Crushing clamp on cord
and do a high inguinal
orchidectomy

→ No further surgery

No cancer

 Transscrotal biopsy / FNAC should not be done in suspected testicular tumors



N - Regional Lymph Nodes - Clinical		
NX	Regional lymph nodes cannot be assessed	
NO	No regional lymph node metastasis	
N1	Metastasis with a lymph node mass 2 cm or less in greatest dimension and 5 or fewer positive nodes, none more than 2 cm in greatest dimension	
N2	Metastasis with a lymph node mass more than 2 cm but not more than 5 cm in greatest dimension; or more than 5 nodes positive, none more than 5 cm; or evidence of extranodal extension of tumour	

```
N<sub>3</sub> > 5 cm

M<sub>o</sub> No distant metastasis

M<sub>o</sub> A: Lungs (m.C) or non-regional lymph nodes

B: metastasis elsewhere
```

10c for staging: PET-CT

Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with Marrow Edition 4 videos.

48

 management: High inquinal orchidectomy Seminoma Non seminomatous tumor → Chemotherapy Stage 1: Good Bad BEP Regimen (Testis) prognostic prognostic features features. • Tumor Single cycle marker of platinum value based ↓ Size chemotherapy Surveillance. → Seminomas are → Induction Chemotherapy Stage 11: If residual Lymph nodes (Testis and highly radiosensitive Radiotherapy to lymph node are present below para - aortic diaphragm) lymph nodes. RPLND (inverted 'Y' field) (Retroperitoneal lymph node dissection) → If Residual Lymph nodes are present -> Chemotherapy → Chemotherapy if residual disease present Stage III : → Radiotherapy (Lymph node → If residual disease is present → Chemotherapy RPLND above diaphragm) → Chemotherapy → Chemotherapy Stage IV (metastasis) B → Bleomycin € → etoposide $P \rightarrow Cisplatin$ Stage IV → There is a role of Metastatectomy -> Improves survival

Active space

Seminomatous tumors and non-seminomatous tumors

Seminomatous tumors

- Show lymphocytic infiltration (good sign)
- Smooth, pinkish looking tumours
- homogenous
- Types:

Anaplastic

Spermatocytic

- Show ↑ in: β hcq and LDH
- · AFP is never raised in pure seminomas.
- Others markers : PLAP (Placental alkaline phosphatase) CD 117 \oplus
 - Highly radiosensitive

Non - seminomatous tumors

- · earlier than seminomas
- · more aggressive
- Show an fin any tumor marker
- Highly chemosensitive
- most important prognostic factor for testicular tumors: Stage of Tumor

Fournier's gangrene

01:20:40

1:16:57

- Necrotising fascitis which involve perineal region.
- Synergistic gangrene (aerobic + anaerobic bacteria)
- Risk Factors
 - Immunocompromised patient
 - → Diabetes mellitus
 - → Starts after trivial trauma
- management
 - → 1.V antibiotics
 - → 1.V fluids
 - → Supportive care
 - → Aggressive debridement
- Testis is not involved (Dual blood supply)

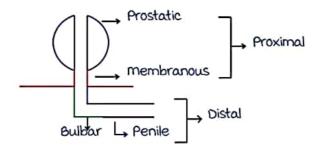


URETHRAL AND PENILE DISORDERS

Anatomy of urethra

00:00:14

- Female urethra → 3 4 cm
- male urethra → 18 a1 cm
- · 4 parts of male wrethra:



- Longest part of male urethra → penile
- Shortest part of male urethra → membranous
- Narrowest part of male urethra → External urinary meatus.
- most distensible → Prostatic
- Least distensible → membranous.

Posterior urethral valves

00:02:40

- males
- · Young's classification

Type I

- most common
- Occurs when the two mucosal folds extend anteroinferiorly from bottom of verumontanum and fuse anteriorly at lower level.

Type a

- Rare
- mucosal folds extend along posterolateral urethral wall from ureteric orifice to verumontanum.

Type 3 (Cobb's collar)

- Circular diaphragm with central opening in membranous urethra.
- Located below the verumontanum and occurs due to abnormal canalisation of urogenital membrane.

Clinical features:

- · uTI
- · Uraemia

Diagnosis: Antenatal or postnatal USG

- · micturating cystourethrogram.
- · Key hole defect.

management: Initially uremia is tackled

- → Foley's
- → Fulguration of valves

Urethral Trauma

00:06:15

Proximal urethral injury

- Injury to prostatic or membranous urethra
- → mechanism → Secondary to pelvic fracture
- → Deep perineal hematoma
- urinary extravasation but it is restricted to upper one third of thigh

Distal urethral injury

- → Injury to Bulbar (m.c.) or penile urethra
- → Straddle
- → Hematoma in scrotum and penis (Butterfly hematoma)

Proximal

On examination

→ High riding prostate / floating prostate (vermooten sign) Distal

Clinical features

- → Inability to pass urine
- → Blood at the tip of meatus.

10C → Rectrograde urethrogram (RGU)

management:

Emergency management

- → Suprapubic catheterization
 - Definitive management
 - management of urethral stricture

short segment Incomplete stricture

- Olu / Vlu (optical /visual internal urethrotomy)
- -> cut at 12 'o clock.
- → 40 50% cure rates

Short segment complete stricture

- End to end anastomosis

works abac

Long segment complete / incomplete

- urethroplasty
 - → graft used
 - → Buccal mucosal graft (Barbagli technique)
 - → Penile foreskin

Fracture Shaft Penis & Hypospadias

00:17:56

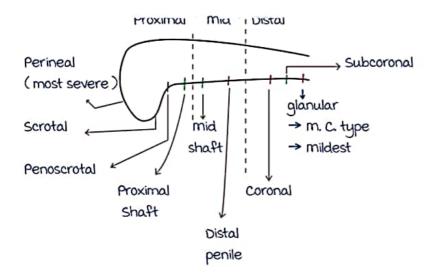
- → Tear in corpora cavernosa
- → Secondary to trauma → Erect penis during intercourse
- → Clinical features: popping sound → penis becomes flacid
 - Hematoma around the penis
 - · Egg plant deformity

management: surgical repair

Hypospadias:

- urethral opening is ventrally placed.
- most common congenital urogenital anomaly
- Seen in 1: 450 → associated with undescended testis and micropenis.

Types of hypospadias:



- Clinical features: hooded perpuce
 - → Chordee → downward bending of penis.
 - → more proximal the hypospadias more severe is chordee.
 - → Downward directed stream of urine.
 - ightarrow Chordee ightarrow difficulty during intercourse .

management → surgery.

foreskin is used for reconstruction

→ Circumcision should be avoided.

Timing of surgery → 6 -12 months.

→ Before 18 months of age.

Principles of hypospadias repair

00:26:39

- 1. Chordee correction / Orthoplasty.
- a. urethroplasty.
- Glans reconstruction → glanuloplasty
- 4. Skin cover → Scrotoplasty
 - → Distal hypospadias → single stage
 - → mathieu repair
 - → magpi (meatal advancement glanuloplasty)
 - → mustardee repair.
 - → mid hypospadias → Single stage / Two stage procedures
 - TIP → Tubularised incised plate repair
 - snodgrass repair
 - → proximal hypospadias → Two stage repair
 - → Thiersch Duplay
 - → Dennis brown repair

Complications of hypospadias repair

- most common → urethrocutaneous fistula.
- a. meatal stenosis.
- 3. Stricture
- 4. Recurrence of chordee.

Ectopia vesicae / Bladder exstrophy

00:30:40

- → Deficient abdominal wall below umbilicus.
- → Anterior bladder wall is also deficient.
- → Pubic diastasis → surgery → Iliac osteotomy.
- → male patients can have undescendend testis, congenital inguinal hernia
- → Female patients can have bifld clitoris.
- → management → multiple surgeries, poor prognosis.

Urethral caruncle

00:33:20

- → Seen in eldrely woman
- → Soft, raspberry like swelling → Pedunculated.

- → Situated in the posterior urethral wall
- → Highly vascular → Bleeding
- → management → Excision using cautery

Fowler's syndrome: Seen in females with PCOS

- ightarrow Abnormal myotonic discharge in the striated urethral sphincter .
- → Diagnosed by → Ema
- → urinary retention
- → management → urethral dilatation is ineffective
 - -> Sacral neuromodulation .

Phimosis

00:36:10

- → inability to retract the foreskin.
- → physiological adhesions → starts going away by two years of age but can persist till 6 years
- → If the problem persists beyond 6 years or if it is symptomatic phimosis → difficulty in passing urine, Ballooning of foreskin, recurrent UTIS, Balanoposthitis. (infection of glans and shaft) hydronephrosis., difficulty during intercourse

management: circumcision

Dorsal incision

Remove excess foreskin

- Plastibell
- Gomco clamp

complications of circumcision:

- most common → bleeding (close to frenulum)
- a. Infection
- 3. Chordee
- 4. Pain

Paraphimosis 4 6 1

00:41:01

- → foreskin forms a constriction ring around the penis.
- → management → conservative

xylocaine jelly

try to reduce the foreskin.

- → small puncture wounds
- → If conservative management fails → Dorsal slit procedure.

Peyronie's Disease

00:42:46

→ Deposition of calcific plaques in corpora cavernosa.

bending of the penis.

Dorsally towards the abdomen.

Causes: Idiopathic

- → 1994 mediated.
- → Secondary to trivial trauma → micro hemorrhages in corpora cavernosa.

calcification.

Active phase → Bend keeps on increasing

(18 - 24 months) ↓

Afterwards it stabilises . (self limiting)

management:

Diagnosis: clinically.

- CT / MRI

Treatment -> calcium channel blockers

→ If progressive → Nesbit procedure

Priapism

00:48:00

- → Prolonged erection of penis → more than 4 hours
- → If more than 6 hours → gives rise to irreversible damage to penis.

Causes

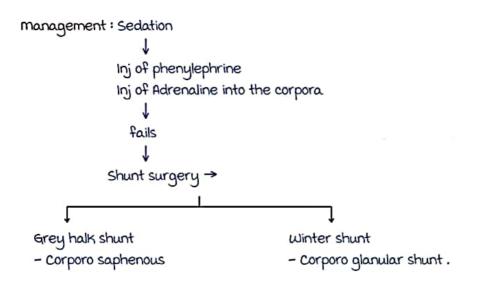
High flow

- → Increased blood flow in the penis
- → Secondary to trauma
- → Fistula between artery and sinusoids
- → Secondary to spinal injury
- → Secondary to papaverine injection.
- → Clinical features:
 - painless
 - penile blood gas analysis shows oxygen in blood.

Low flow/ischemia

- → most common
- common in children who are suffering from:
 - Leukemias
 - Lymphoma
 - sickle cell anemia
- → Antipsychotic medications
- secondary to papaverine injection
- → clinical features :-
 - painfull
- → Deoxygenated blood.
- → Diagnosis: penile angiography.

Active space



Penile cancer

00:52:57

Premalignant condition:

- (1) Bowens disease → shaft of penis
- (a) If they involve glans → Erythroplasia of Queyrat
- (3) Genital warts → HPV
- (4) Balanitis xerotica obliterans.
- (5) Leukoplakia

pathology of penile cancer:

- → squamous cell carcinoma.
- → most common gene → p53
- Buschke Lowenstein tumor → slow growing
 - → grows outwards
 - → HPV
 - → good prognosis

Clinical features of penile cancer:

- → ulceroproliferative growth
- → Foul smelling
- → 50% patients have inquinal lymph node
- → But majority are due to infection

Diagnosis: Incisional biopsy

→ Staging: MRI

TNM staging or Jackson:

T, → skin

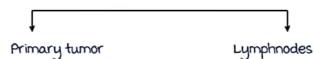
T → corpora

T, → urethra

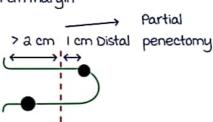
T → Adjacent structures

management:

- Bowen's disease → Topical 5 fluorouracil cream
 CO_a laser ablation
- If early penile cancer → only involving glans → glansectomy
- Surgery → first line



· 1 cm margin



>a cm length \rightarrow Total amputation of penis and urethra is put into the perenium

Lymph nodes:

- Infection → resolves after a weeks of antibiotics
- ullet cancer ullet llioinguinal lymphnode dissection or radiotherapy to lymph node .
- If lymph nodes are not enlarged
 - → Sentinel lymph node biopsy
- Chemotherapy → 5 Fu
 - Cisplatin

metastatic disease

- most important prognostic factor → Inguinal lymph node status
- most common cause of mortality →

Erosion of femoral or iliac vessels due to involved lymph nodes

BLADDER

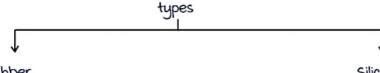
Foley's catheters

00:00:10

French: outer circumference → aIIr

Color	Size french	size millimeter
 Yellow 	10	3.3
• white	ıa	4.0
• Green	14	4.7
• Orange	16	5.3
• Red	18	6.0

- · 3 way foleys :- Balloon
 - Urine to come out
 - Irrigation
 - used in patients with clot retention



Rubber

Silicone → 30 - 35days

- → 7 days
- Pericatheter leakage: 1. Put in a larger sized foley's
 - a. Inflate the balloon further
- Stuck foley balloon: USG guided suprapubic puncture of the balloon



Remove all the rubber fragments.

Bladder trauma

00:05:15



Interstitial cystitis / Hunner's ulcers

00:09:44

- Common in women
- · Clinical features : Pain
 - Increased frequency
 - · Over distension of bladder
- Diagnosis → Cystoscopy
 - Linear ulceration in the mucosa (Fundus)
 - Fibrosis
 - → Histopathalogy: infiltration of lymphocytes into the tissue.

management: Hydrostatic distension

→ Dimethylsulphoxide.

Bladder diverticulum:

,

Congenital

- → Seen in region of persistent urachus
- → present in midline
- → Anterosuperiorly

Pulsion

- Secondary to increased pressure
- → Seen in 8PH/ Bladder outlet obstruction
- → Above and to the side of one ureteric orifice
- → very large diverticulae

ureteric obstruction

Clinical features:

- Increased frequency of micturition
- urge to pass urine in rapid succession after changing position.

Complication:

- I. UTI
- a. Stone formation due to stasis
- 3. Hydronephrosis

management: Only symptomatic patients

require diverticulectomy.

Bladder cancer

00:16:03

Transitional Squamous Adenocarcinoma cell carcinoma cell carcinoma - mc in Africa - Seen in the region most common of persistent urachus Risk factors - Cigarette smoking - Smoking - trigone. - Cyclophosphamide - Schistosomiasis - Chemicals- anilene Bilharziasis → SCC dyes

Genetics :- NATA and GSTMI

Consistent germline markers for bladder cancer

Clinical features:

→ Gross painless hematuria

Workup:

- → use kub → growth in bladder
 - → clots
 - → Status of Kidney
- → Urine test: urine routine and microscopy
- → cytologgy → low Sensitivity.

Active space

NmP aa(Nuclear matrix Protein Number aa.)→ Bladder cancer marker

Staging of bladder cancer

00:22:48

TX → Primary tumor cannot be assessed

TO → No evidence of primary tumor

Ta → Noninvasive papillary caricinoma

Tis → Carcinoma in situ

TI → Tumor invades subepithelial connective tissue (lamina propria)

Ta → Tumor invades muscularis propria bladder wall

Taa → Tumor invades superficial muscle (inner half)

Tab → Tumor invades deep muscle (outer half)

T3 → Tumor invades perivesical tissue

T3a → microscopically

T3b → microscopically (extravesical mass)

T4 → Tumor invades any of the following: prostate, uterus, vagina, pelvic wall, and abdominal wall.

T4a → Tumor invades prostate, uterus or vagina

T4b → Tumor invades pelvic or abdominal wall

Grade 1 → Well differentiated

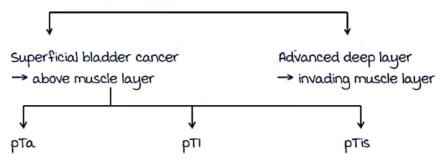
Grade a \rightarrow moderately differentiated.

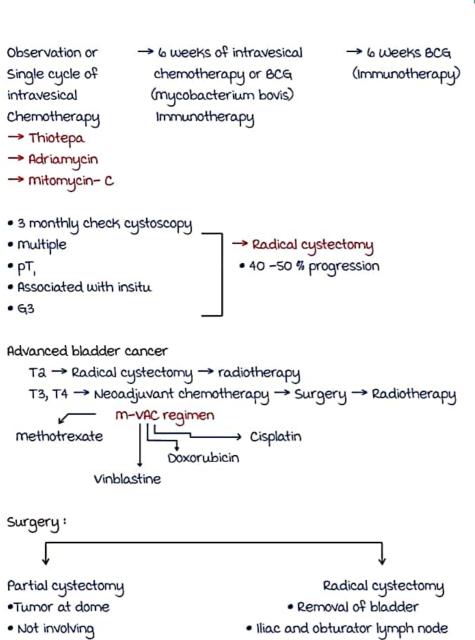
Grade 3 \rightarrow Poorly differentiated.

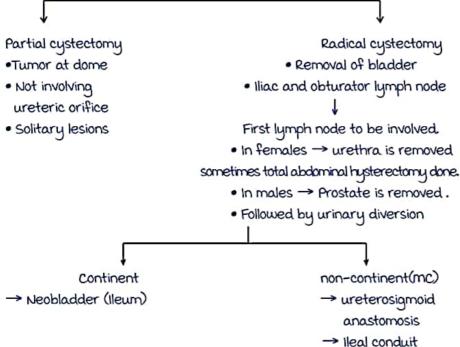
PUNLMP → Papillary urothelial neoplasm of low malignant potential.

management: TURBT

(Nd: YAG laser)







- 1. Increased risk of UTI
- a. 100 times higher risk of adenocarcinoma at the site of anastomosis
- 3. Hypokalemic, hyperchloremic, metabolic acidosis.

Ileal conduit:

- ightharpoonup most common non-continent urinary diversion .
- most common complication → Stricture at site of anastomosis
- most important prognostic factor → depth of invasion or 'T' stage.

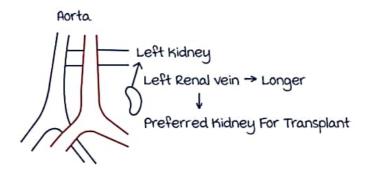
KIDNEY - 1

Surgical anatomy

- Kidney develops from metanephric bud in the Iliac fossa and ascends up to its adult position
- Hilum



Dromedary humps - Physiological lobulations which can persist in adults



Nutcracker Syndrome

Lt renal vein is pressed between aorta and superior mesenteric artery

Renal Collar

Lt renal vein splits and encases the aorta.

Renal agenesis

00:03:36

- 1 in 500 1000 patients
- Usually unilateral
- Patients will also have agenesis of ureter and the hemitrigone on that side
- males can have undescended testis. Females can have absent fallopian tube on that side

In some patients ipsilateral adrenal gland absent

Leave Feedback

Duplication of the system



- Image Shows duplication of ureter & pelvis - Wiegert - meyer's rule

" ureter draining the upper pole is going to cross the normal ureter and opens more distally and medial to ureter draining lower pole"

A sis - Ivu

management - Reimplantation of ectopic ureter.

u/1>8/L,Lt>Rt F>m

Duplication & malrotation of pelvis



Drooping Lily sign IVU sign

Horseshoe Kidney

00:08:52



• If the lower ends of Kidney fused

Horseshoe Kidney,

fails to ascend upto the normal position

vente para

thus the fused portion lies at the level of L3-L4 ascent of the kidney is restricted by Inferior mesentric vessels

But adrenals are normal in position

Clinical features

- 1. Asymptomatic
- a. Dull pain
- 3. Abdominal lump
- 4. Stones
- Hydronephrosis
- Flower vase appearance / Hand shake sign on IVU
- If pelvis is malrotated → ureters kinked → Stone formation and Hydronephrosis

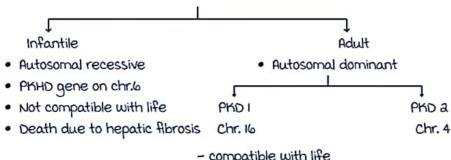
If patient is symptomatic

Never cut the fused portion Exception Horseshoe Kidney + symptomatic abdominal aortic aneurysm

If hydronephrosis - pyeloplasty

 Patients with horseshoe kidney have 1 risk of upper urinary infections during pregnancy.

Polycystic Kidney Disease



- compatible with life

- cysts in kidney enlarge 9 press on normal renal parenchyma

Renal function - impaired In males progression faster than in females

Symptomatic - 3rd decade of life.

51

m.C clinical feature - Hypertension > mass> pain > hematuria

Extrarenal manifestations

- 1. mc Hepatic cysts
- a. Cysts can be seen in spleen, pancreas, lungs.
- 3. Colonic diverticulus
- 4. Mitral valve prolapse
- 5. Berry aneurysms in circle of Willis

Can lead to SAH

Diagnosis

USG- multiple cysts in Kidney.

Prenatal - if more than 3 cysts whether U/L or B/L USG or more than a cysts in each kidney

Polycystic Kidney disease

Pain due to hemorrhage inside cysts or renal stones (m/c : uric acid stones)

management

- 1. Long term dialysis
- a. Transplant
- 3. Rovsing procedure i.e Deroofing cyst is not useful
- 4. mTor inhibitors / vasopressin analogues

Multicystic dysplastic kidney

00:21:36

- multiple cysts in Kidney
- WL or B/L

Not compatible with life.

Abdominal lump at birth

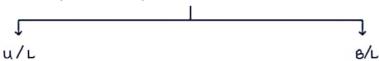
in adults → Rapid progression to renal failure

m_x → conservative can be associated with

· atresia of ureter on that side.



Definition: Aseptic dilation of pelvi - calyceal system due to intermittent partial / complete blockade to flow of urine



causes of unilateral hydronephrosis.

- 1. Intra luminal causes
- A. MC acquired Cause renal stones
- B. Sloughed papilla __ Analgesic abuse __ Diabetics
- a. Intramural causes
- A. Congenital PUJ obstruction MC congenital Cause of hydronephrosis. Adynamic obstruction

No physical obstruction Lack of PUJ of contration / relaxation.

B. Transitional cell carcinoma of pelvis



c. ureterocele

When lower end of ureter are dilated

ineffective drainage of urine

-m>F

- 10% are B/L

IVU

Cobra head / Adder head appearance.

Management - Resect the abnormal portion & reimplant ureter

- Endoscopic incision (disadvantage - reflux)

Leave Feedback

Extraluminal Causes

00:30:14

- A. Aberrant renal vessels
- usually W/L
- compress pelvis from outside
- Never cut the vessels

devascularises the parenchyma management - pyeloplasty

- B. Advanced cancers
- Rectal cancer
- cervical cancer
- Retroperitoneal sarcomas
- C. Retrocaval ureter. Rt ureter goes behind IVC

IVU - Fish Hook / Reverse J ureter.

management - Lateralise the wreter - cut the segment behind IVC \$ do wretero wreterostomy.



- D. Retroperitoneal fibrosis
- · A/K/A Ormand's disease
- · causes 1. Idiopathic
 - a. Drug induced
 - methylsergide
 - Bromocriptine
 - 3. 199 mediated.

(associated with dupuytren contracture & Peyronies disease)

4. Post radiotherapy

Arst structure involved in retroperitoneal fibrosis



maiden's waist deformity



wouse shace

- DJ stents (double "J" stents)

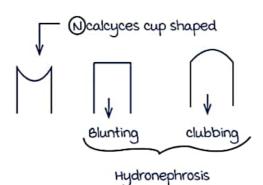
Bilateral Hydronephrosis Causes

00:36:32

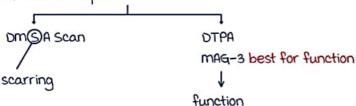
- 1. Any unilateral cause on both sides
- a. Bladder outlet obstruction
- 3. BPH
- Posterior urethral valves (Type 1 - mc)
- 5. Phimosis
- 6. meatal stenosis



DIVU



a) Renal isotope scan



mag -3 scan

Total GFR

Differential GFR Rt



if the hydronephrotic Kidney contributes > 20% of GFR i.e

> 20% Total GFR - save

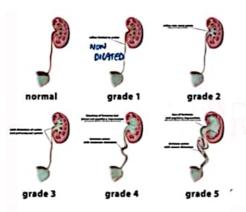
if function improves doesn't improve

< 10 % Total GFR - Nephrectomy

save

Active space

Nephrectomy



- seen in 3 -5% girls and 1 2% boys.
- < 3 month mc boys
 > 3 month mc girls.

Grading Normal

- 1. Reflux into non dilated ureter
- a. Reflux into pelvis but no distension
- 3. Reflux with mild distension
- 4. Blunting of calyces / Tortuous ureter
- severe distension of ureter along with loss of papillary impressions.

Reflux

upper urinary infections

pyelonephritis

If not managed properly with

V adequate antibodies

chronic pyelonephritis

+

Scarring of renal parenchyma (usually occurs between day 3 - day 5)

if scarring +

Affects renal 10-20%

Function Hypertension

chronic pyelonephritis

Secondary to VUR is mcC of

renal transplant in children < 19yrs in UK

The state of

Investigation 1. mcu - micturating cystourethrogram / IVU a. DMSA SCAN Scarring 1. VUR grade 1 - 3, age 0 - 10yrs antibiotic prophylaxis → spontaneous resolution 11. VUR grade 4/5, age 0-10yrs antibiotic prophylaxis. III. Grade 5usually in addition to antibiotics patient requires endoscopic treatment , fails open surgery to reimplant ureter Endoscopic treatment Sting procedure HIT

Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with Marrow Edition 4 videos.

Renal stones 00:51:04

Concentration product:

Amount of solute in a solution

subureteric teflon injection

Now material is injected

material: Deflux

saturation product

max. amount of solute in a solution

CP> SP → stone ⊕

but it doesn't happen

because of stone inhibiting factors

1. citrate (mc) → most important

Surgery • v2.0 • Marrow 4.0 • 2020

Hydro distension implantation

technique

Formation product

max. concentration of solute in solution after taking into account stone inhibiting factors

CP > FP -> stone

Types of stones

00:54:10

- 1. Caª oxalate
 - mc renal stones
 - Radio opaque
 - found in acidic urine





Recurrent calcium oxalate stones

Advice

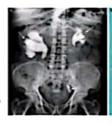
- D I fat in diet
- a) 1 caª intake diet
- 3) Large doses of pyridoxine
- 4) cholestyramine

bind oxalate in gut.

↓ incidence

- a. Triple phosphate / struvite / staghorn stone
- Caa+, mga+, ammonium PO,
- Radio opaque
- Formed in alkaline urine

infected with organisms like proteus





June aking

increase in size before symptoms appears

- coffin lid crystal

Recurrent struvite stones

Aceto hydroxamic acid (medical management)

- 3. Cystine stones
- Radio opaque
- Acidic
- Very hard hard crystalline.
- Difficult to break by ESWL.



seen in

a) Cystinuria

Recurrent stones Treatment - d- Penicillamine

- 4. uric acid stones
- mc radiolucent stones
- Acidic urine
- crystals resembles "Glass shards ".

seen in

- a) Gout
- b) Tumor lysis syndrome

Treatment of recurrent uric acid stones - Allopurinol

Ammonium urate stones

can be seen in inflammatory bowel disease, laxative abuse

Rare Stones & clinical features

01:03:08

- 1. Xanthine stones brick red
- a. Triamterene stones
- Indinavinir stones

Radiolucent

Clinical features

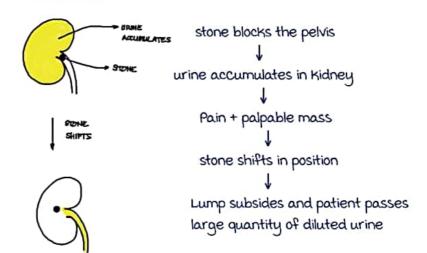
-Asymptomatic m/c - pain

- 3) Lower ureter Ilioinguinal nerve
- 4) Intramural part of bladder Strangury

strangury - intense urge to pass urine associated e pain at tip at tip of penis

only able to pass I -a drops of bloody urine

- Hematuria
- Hydronephrosis
- Dietl's crisis



Investigation & Management

01:09:24

10C - NCCT also 10C for Thead injury Lsalivary gland stones 90% renal stones radiopaque

management:

 \leq 5 - 6mm - observation (spontaneously pass) ESWL (Extracorporeal shock wave lithotrypsy) (blast wave dynamics)

Directing ultrasonic waves → stone → shatter

Strongest: Dornier apparatus

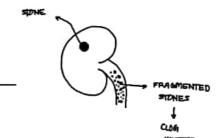
Complications of ESWL

1 pain (m/c)

11 Hematuria.

III stone street (steinstrasse) ¿

IV UTI



Contraindications to ESWL

- 1. Pregnancy
- a. Uncontrolled bleeding disorders
- 3. Cardiac pacemaker
- 4. Stone > 1.5 cm size
- 5. Children
- 6. Obese
- 7. Very hard (cysteine > Ca oxalate monohydrate)
- 8. Obstructed system
- 9. Lower calyx stone



-> Fragment needs to travel against gravity

If ESWL contraindicated



PCNL

Percutaneous nephro

lithotomy

RIRS Retrograde intra-renal surgery

aka renoscopic lithotrypsy

1. Dormia basket

a. Lasers can be used Holmium YAG laser C

RETROGRADE APPRO ACI

Preferred in obstructed system

Complications of PCNL: Bruising

Hemorrhage

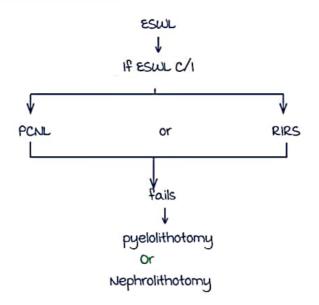
Hematuria

Injury to colon or spleen

Injury to pleura

Summary of management

01:19:54



Anatrophic nephrolithotomy

incision along Brodel's line (avascular plane in Kidney)

Ureteric stones

01:21:42

11. S -6mm stone - observation

11. larger stone in ureter

Non impacted impacted

ureteroscopic removal (RIRS) → fails → uretero lithotomy

use longitudinal incision (horizontal → sticture)

Suture absorable suture __vicryl

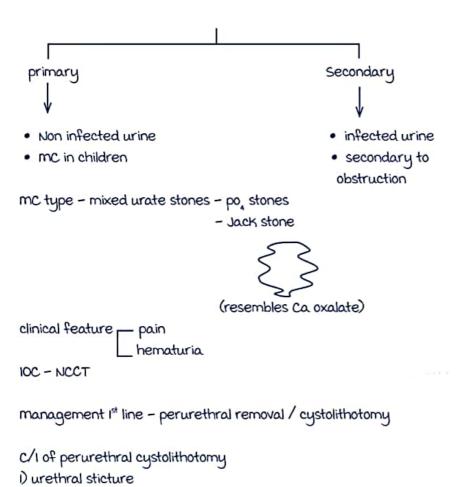
DJ stents (double 'J')

a) very large stone

3) stone in a bladder diverticula

suprapubic cystolithotomy

* Keyhole sign: posterior urethral valve

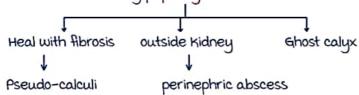


KIDNEY-2

Renal infections

Renal and genitourinary tuberculosis

- · a infection
- Hematogenous
- Earliest lesion in Kidney papillary ulcer



caseous necrosis Kinking of UPJ

pyelonephrotic kidney Kerr's Kink

or

Putty kidney

Calcification

Cement Kidney

Stricture & shortening of ureter.

Ureteric orifice can remain open

Golf hole ureteric orifice

Earliest sign: paleness of mucosa of bladder

When ulcers heal with fibrosis → thimble bladder(↓ capacity)
Prostate - boggy granulomatous prostatitis

Watermelon prostate

Epididymoorchitis → vas - beaded cragqy epididymis

Clinical Features

00:07:32

- 1. Pain
- a. Hematuria
- 3. Weight loss

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Urine examination
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Sterile pyuria → pus cells⊕ but culture⊖

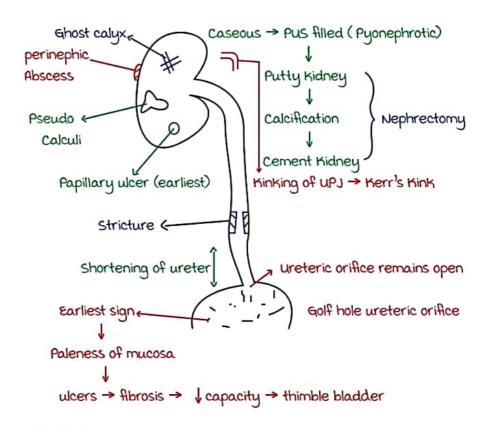
Diagnosis: 3 morning samples of urine

|
ZN staining

Imaging → CT urography
(Earlier IVU most sensitive)

m - ATT

- Intervention should be done after 4 - 6 wks of ATT



Intervention

- 1. Drain abscess
- a. Putty Nephrectomy
- 3. Kerr's kink DJ stent
- 4. Shortening of ureter Boari flap repair

(Lower end of ureter)

- 5. Golf hole wreteric orifice wreter reimplantation
- 6. Thimble bladder augmentation cystoplasty (using ileum)

Infection involving Kidney
 Hematogenous ascending infection

- F>m
- MC in children
 Puberty
 Pregnancy

Clinical features

- 1. Pain (loin)
- a. Fever
- 3. Nausea
- 4. Vomiting

urine → pyuria casts

10C - CECT → To R/O pyelonephrosis

↓

↓ Opacification of affected parenchyma.

↓

Patchy / linear distribution

mc organism E. coli

management - appropriate antibiotic therapy

Special types of pyelonephritis

00:14:55

- 1 Emphysematous pyelonephritis
 - · Ecoli
 - mc in immunocompromised, Dm

Clinical features

- Fever
- · Pain

IOC CECT - gas in and around Kidney.

Management - Antibiotics ₹ drainage

↓ fails

Nephrectomy

11. Xanthogranulomatous pyelonephritis

- · Proteus > E.coli
- Exclusively in middle aged females
- Dm

C/F

- · Flank pain
- Pyrexia
- Abdominal mass

IOC CECT _ non functioning kidney Low density mass Calculi

management - Nephrectomy (subcapsular)

Renal carbuncle

- Renal cortical abscess
- Dm / drug abusers
 management drain
 mc organism staph. aureus

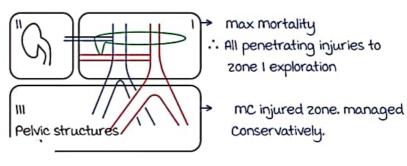
Renal corticomedullary abscess

- Ascending infection
- · E Coli
- Can also form perinephric abscess

Retroperitoneal and renal trauma

00:20:34

Zones of retroperitoneal injury.



24 - above superior mesentric vessels.

Active space

Grade'	Description Of Injury	
1	Contusion- Microscopic or gross hematuria, urological studies normal Hematoma- Sub capsular, nonexpanding without parenchymal Laceration	
2	Hematoma -Nonexpanding perirenal hematoma confined to renal retroperitoneum Laceration -<1.0 cm parenchymal depth of renal cortex without urinary extravasation	
3	Laceration ->1.0 cm parenchymal depth of renal cortex, without collecting system rupture or urinary extravasation	
4	Laceration- Parenchymal laceration extending through the renal cortex, medulla, and collecting system Vascular -Main renal artery or vein injury with contained haemorrhage	
5	Laceration- Completely shattered kidney Vascular- Avulsion of renal hilum which devascularizes kidney	

*Advance one grade for multiple injuries to same organ

10C for renal trauma.

stable

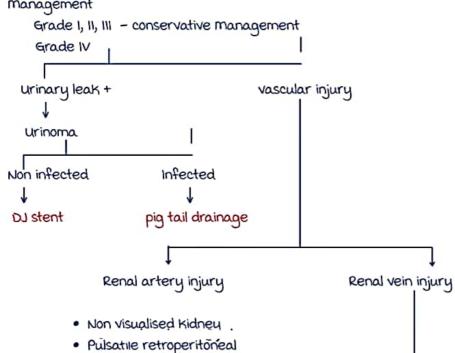
unstable

CT urography

single shot IVU

management

Grade I, II, III — conservative management



Grade IV partial /Total nephrectomy

Hematoma

Exploration after vascular control

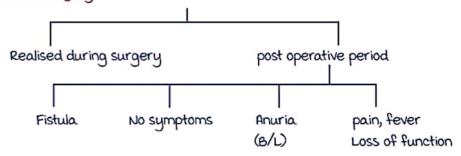
- 1. Hematuria
- a. Urinoma
- 3. AV fistula
- Renal artery thrombosis → Renal infarct
- 5. meteorism

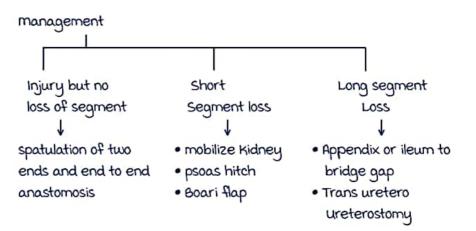
V Colonic distension seen 24 - 48 hrs after retro peritoneal

6. HTN

Ureteric injury

Hematoma





Renal tumors

00:37:33

Benign tumors

Class	Description	Features	Workup	% malignant
ı.	Simple cyst	Anechoic, imperceptible wall, round	Nil	-0%
2	Minimally complex	Single thin septation, thin calcification	Nil	-0%
2F	Minimally complex- (need follow up)	Thin septation, thick calcification, hyper dense on CT	USG or CT followup	5%
3	Indeterminate	Thick or multiple septation, mural nodule	Partial nephrectomy	50%
4	Clearly malignant	Solid mass with cystic spaces	Partial/Total nephrectomy	~100%

1 Angiomyolipoma

- · Benign blood vessel, muscle and fat
- · Arises from perivascular epitheloid cells
- · 5th 6th decade of life
- · Sporadic > familial

1

Tuberous sclerosis

- multiple
- Shagreen patches
- Ashleaf macules
- Adenoma sebaceum

C/F · Asymptomatic

· Abdominal pain / lump

Some - massive Retroperitoneal hemorrhage

Wunderlich syndrome

Lenk's triad

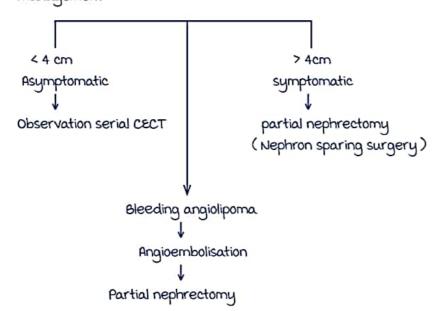
- mass
- Pain

10C - CECT

Shock

High fat content

management



IHC → HMB 45①

mc benign tumor of kidney

· Cells rich in mitochondria



Birt Hogq Dube syndrome

- chromosome 17
- Oncocytomas
- Chromophobe RCC
- · Fibro folliculomas / tricho discomas

C/f: Asymptomatic

Lump

IOC - CECT

Central stellate scar

management

Partial nephrectomy (if diff between oncocytoma and chromphobe RCC is not possible)

Renal cell cancer

00:48:33

Grawitz tumor / Hypernephroma / Internist's tumor.

Risk factors

- I. DM
- a. HTN
- 3. Tobacco intake
- 4. Thorotrast exposure
- 5. 1 Protein intake

Syndromes

1. VHL (von Hippel Lindaw) VHL gene (chr.3)

V

Clear cell RCC

- a. Hereditary papillary RCC syndrome Papillary RCC
- 3. Birt Hogg Dube syndrome Chromophobe RCC

Tumors associated with syndromes

- · Tend to occur earlier
- · Tend to be bilateral

- 1. mc · clear cell
 - · Genetics del. 3p and 8p
 - PCT
 - · Associated with VHL
- a. Papillary RCC Hereditary papillary RCC syndrome
 - Psammoma bodies → CMET mutation
 - · Site of origin PCT > DCT

micro papillary variant - seen in Long term dialysis therapy

- 3. chromophobe RCC -> Loss of multiple chromosome (1, a, 6, 10, 13)
 - Birt Hogq Dube syndrome
 - Tan mahogany color tumor

(

Typical central stellate scars

- · Plant like cells Tresin like nucleus
- Cytokeratin ⊕

(Oncocytoma - CKO)

Best prognosis

4. Collecting duct / Bellini Ca



- Worst prognosis
- · Genetics del. I q, monosomy of multiple chromosome

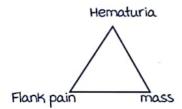
Medullary RCC

00:57:04

- Patients with sickle cell anaemia
- Poor prognosis

Clinical features

1. Typical triad - 10-15% patients.



- a. mc presentation gross hematuria
- 3. Other /atypical
 - a. Spread along renal vein (not mets)
 Lt. sided tumors → secondary varicocele.
 - b. Cannon ball mets to lungs.

(mc site of mets)

- 4. Paraneoplastic syndromes
 - -mc. TESR

Paraneoplastic Syndromes in Renal Cell Carcinoma

Endocrine	Nonendocrine
Hypercalcemia	Amyloidosis
Hypertension	Anemia
Polycythemia	Neuromyopathies
Nonmetastatic hepatic dysfunction	Vasculopathy
Galactorrhea	Nephropathy
Cushing's syndrome	Coagulopathy
Alterations in glucose metabolism	Prostaglandin elevation

Neuromyopathy - Lambert Eaton Syndrome
 Non metastatic - Stauffer Syndrome
 Hepatic dysfunction - 1L -6

† Bilirubin

1 ALP

values reduce after nephrectomy

- Pulsatile bony metastasis.

100 - CECT (diagnosis & staging)

Radiological Diagnosis

GIST

Cholangio ca

Periampullary tumor.

TNM Staging Of RCC

1:03:07

TO No evidence of primary tumor

T1 Tumor < 7 cm in greatest dimension, limited to kidney

T1a Tumor < 4 cm in greatest dimension, limited to kidney

T1b Tumor > 4 cm but < 7 cm in greatest dimension, limited to kidney

Tumor ≥7 cm in greatest dimension, limited to kidney

Tumor extends into major veins or invades adrenal gland or perinephric tissues, but not beyond Gerota's fascia

T3a Tumor invades adrenal gland or perinephric tissues but not beyond Gerota's fascia

T3b Tumor grossly extends into renal vein(s) or vena cava below diaphragm T3c Tumor grossly extends into vena cava above diaphragm

T4 Tumor invades beyond Gerota's fascia

 N_0 - No lymph node N_1 - +ve lymph

(First drained by para aortic lymph nodes)

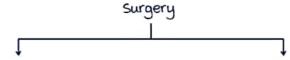
m - Lungs are the m/c site of distant metastasis

- · Robson's staging can also be used.
- Fuhrman grading Grading system of RCC

Management of RCC

01:06:02

- Surgery is the mainstay of management
- RCC _ chemoresistant Radioresistant



Partial nephrectomy

- T I tumors
 Restricted to the poles
- · B/L RCC
- RCC in a solitary functioning Kidney
 Relative

1

RCC in a kidney where other kidney is affected by

- Hydronephrosis
- Stones

if metastasis + - Debulking surgery

- · mTOR inhibitors Everolimus .
- IL -a therapy
- Sunitinib / sorafenib

Cryoablation

- Principle of rapid freezing 9 gradual thawing
- Temperature ao°c
- Ablative margin with in 3 -5 mm of iceball
- multiple comorbities
- Palliative measure

most important prognostic factor - pathological stage.

Radical nephrectomy

- kidney along with Gerota's fascia
- ureter till pelvic brim
- para aortic lymph node ±
 lpsilateral adrenal (T3/T4 /involved)

Active space

- Pediatric age group tumor
- mc pediatric renal malignancy
- and mc pediatric abdominal malignancy

(1st - neuroblastoma)

Sporadic > familial

WAGR

w - Wilms

A - Aniridia

G - Genitourinary malformations

R - Retardation

Deny's drasch

Wilms

Intersex⊕

mental retardation.

Beckwith weidmann syndrome

- Wilms
- · Hemihypertrophy
- Omphalocoele
- · mental retardation
- · can be b/L

C/F

- a-syrs of age
- Abdominal lump → rarely crossing midline
- Hematuria
- Pain

Can also spread along renal vein (not considered mets)

mc mets site → lungs

LN → para aortic

10C - CECT - peripheral calcification

Differentiate between - intratumoral calcification

Neuroblastoma - Vascular encasement

National Wilms Tumor Study (NWTS) staging Stage I: Tumor confined to the kidney & completely

Stage II: Tumor outside the kidney but completely excised

Local tumor spillage during surgery

Lymph nodes negative Stage III: Non hematogenous disease confined to the abdomen

Perioperative rupture of renal capsule Diffuse tumor spillage during surgery

Peritoneal implants

Positive lymph nodes

Stage IV: Hematogenous metastases to lungs or live

Stage V: Bilateral Wilms' tumor

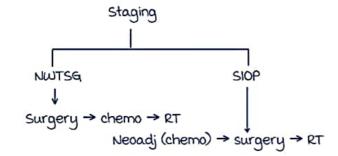
m of Wilms

Responds to surgery

Chemosensitive

Radiosensitive

Surgery principles same as RCC



Chemo - Dactinomycin

Vincristine

Cyclophosphamide.

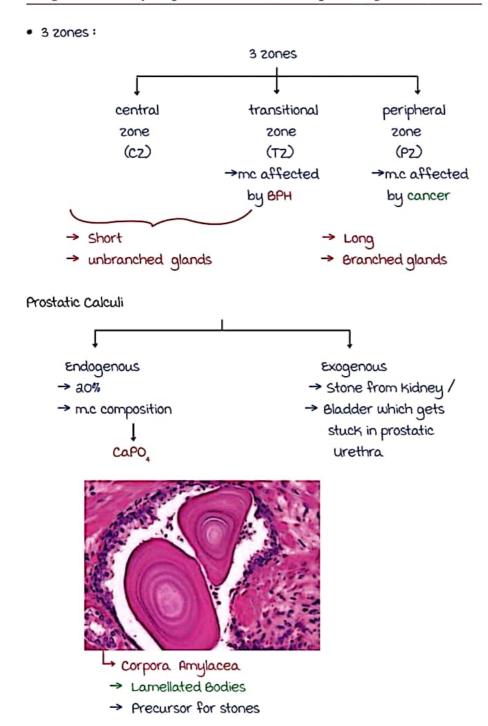
most important prognostic factor - histology.

- Epithelial Blastemal component

Higher the blastemal component poorer the prognosis

PROSTATE

Surgical anatomy of prostate and related pathologies 00:00:24



```
Prostatitis
  Acute bacterial
                                         Chronic bacterial
     Prostatitis
                                              prostatitis
                                      → 3 Tube test after prostatic
> m.c : E. coli
→ secondary to UTI
                                           massage
→ Clinical feature
                                       → management : Antibiotics

    Perineal pain

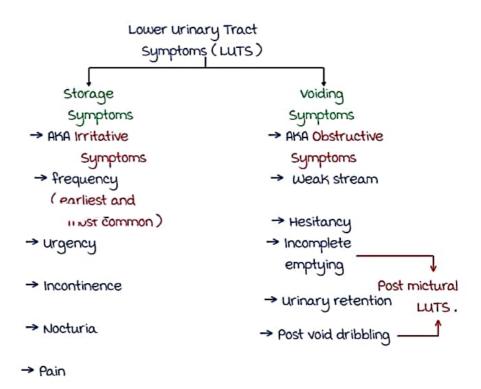
                                                     (4 - 6 weeks)

    Fever

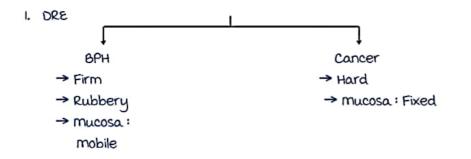
→ (Digital rectal examination): Tender,
                                Boggy prostate
→ management:

    Antibiotics

           (a-3 weeks)
```



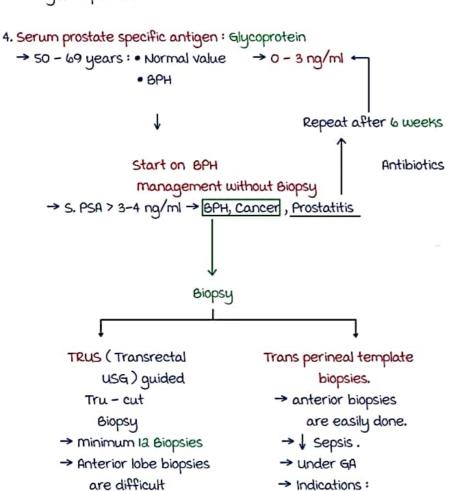
- Voiding and post mictural LUTS → Bladder outlet obstruction
- Storage LUTS \rightarrow Neurogenic Bladder



- a. Urine Examination
 - → Routine and microscopic examination
 - → Sugar and blood in urine
 - → Urine culture and sensitivity
- 3. USG KUB
 - → Prostate volume
 - → Residual urine
 - → Hydronephrosis

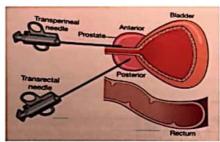
→ ↑ Sepsis

→ under LA



1. Anterior lobe biopsy a. Raised PSA but negative

TRUS guided biopsy.



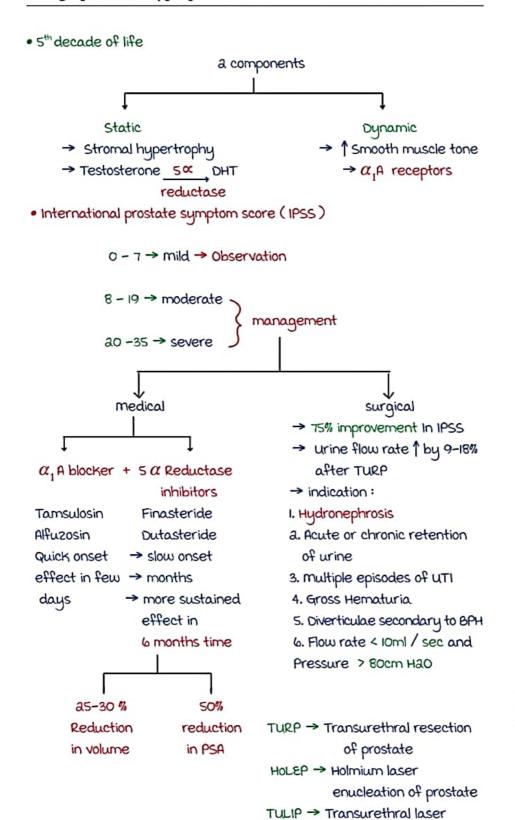
```
→ > 10 - 15 ng/ml : Locally Advanced Cancer
                           Biopsy
→ > a5 - 30 ng/ml : metastatic cancer
→ PSA value not affected by DRE
→ Free PSA is more sensitive
   Reduction in % of free PSA is indicative of cancer
→ PSA velocity: > 0.75 ng/ml/year
→ BPSA (nicked)
                            in benign conditions
   Pro PSA: 1 in cancer
5. uroflowmetry
       → Accurate measurement if patient voids: > 200 cc
          > 15 - 20 ml/sec -> normal
          10 - 15 ml/sec -> Equivocal
          <10 ml/sec → Bladder outlet obstruction. (800)
6. Bladder pressure (cystometry)
           > 80 cm H<sub>0</sub> -> High
           60 - 80 cm H<sub>2</sub>0 → Equivocal
           <60 cm H<sub>0</sub> → Normal
· 800 / BPH
                                       Neurogenic Bladder
→ High pressure
                                        → very low pressure
> Low flow rate
                                        → Low flow rate
· marion disease
```

(Prostatism sans prostate)

- → Seen in young patients
- → Features of LUTS, but prostate normal
- → Hypertrophy of internal sphincter

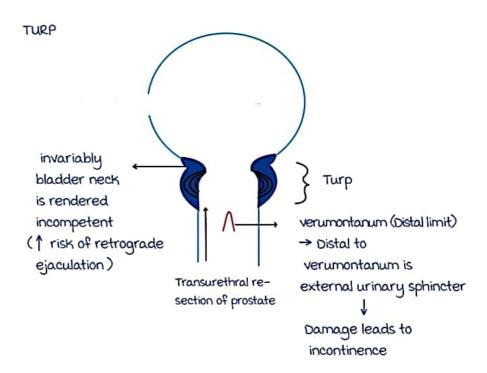
Benign prostatic hyperplasia

00:25:13



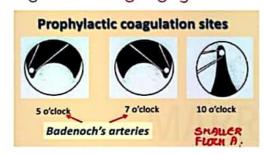
incision of prostate

- → Best laser
- → 532 nm
- → Vapourisation of tissue
- → Haemostatic
- → Can be used in patients on anticoagulants
- · Lasers help in : faster surgery - ↓ Blood loss

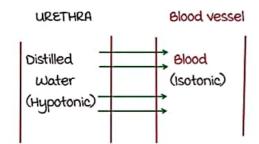


- Irrigating fluids:
 - → Hypotonic → 5 % dextrose Distilled water > 1 Risk of TURP syndrome
 - → Isotonic glycine : Best
- → NS → can only be used if B TURP (Bipolar)

Haemorrhage → m.c during surgery



- → Badenoch's arteries: m.C cause of bleeding
- → Both badenoch's arteries and smaller flock arteries are branches of inferior vesical artery
- a. Clot retention
 - → To prevent: 3 Way foleys
- 3. TURP syndrome / water intoxication / dilutional hyponatremia



Before surgery

- Na + : X
- · Blood :Y volume

After surgery



Dilutional

hyponatremia

- → aoml/ min is the water exchange during surgery (~ 50 minutes)
- · Clinical features: within 4-6 hours
 - → confusion
 - → Disorientation
 - → Nausea and vomiting

management

If s. Na + <120 meg/L > 120 meg/L

Severe Fluid restriction.

- → 3% Hypertonic saline
- → gradual correction: not more than 8-10 mEq/L/day
- → IF rapid correction:

Central pontine demyelinosis Central pontine myelinolysis

- → Reduction of TURP syndrome:
 - isotonic Glycine
 - · Faster surgery
- 4. Incontinence
- 5. Retrograde Ejaculation
 - → m.c : overall
 - → 60-70%
 - → Bladder neck injury
- 6. Re-operation: 5-15%
- 7. Stricture:
 - → m.c site : Bladder neck
 - → if large resectoscope used →m.c site: meatal stenosis

Prostate imaging reporting and data system

PI-RADS

PI-RADS 1 = Very low (clinically significant cancer highly unlikely)

PI-RADS 2 = Low (clinically significant cancer unlikely)

PI-RADS 3 = Intermediate (clinically significant cancer equivocal)

PI-RADS 4 = High (clinically significant cancer likely)

PI-RADS 5 = Very high (clinically significant cancer highly likely)

Prostate cancer

00:53:01

- · Risk :
 - → ↑ Age
 - → ↑ Testosterone
 - → African American males

- → BRCA a > BRCA I
- → M.C gene : GSTP-1 chromosome 11
- -> Alcohol
- → Smoking
- screening:
- → 50 years
- → annual
 - · DRE
 - PSA
 - DRE + PSA → Best modality

· Gleason score

→ Grading for prostate cancer

m.c occuring
gland type

and m.c occuring
gland type

Minimum : I+I = aMaximum : 5+5 = 10

Higher the Gleason's score → Poorer the prognosis

· updated classification:

Risk Group	ISUP Grade Group	Gleason Score
Low	Grade Group 1	Gleason Score ≤6
Intermediate Favorable	Grade Group 2	Gleason Score 7 (3+4)
Intermediate Unfavorable	Grade Group 3	Gleason Score 7 (4+3)
High	Grade Group 4	Gleason Score 8
High	Grade Group 5	Gleason Score 9-10

- \Rightarrow Gleason score 7= (3+4) has better prognosis than 7=(4+3).
- IOC : TRUS or transperineal Tru cut biopsy

· Staging : PET -CT

T stage:

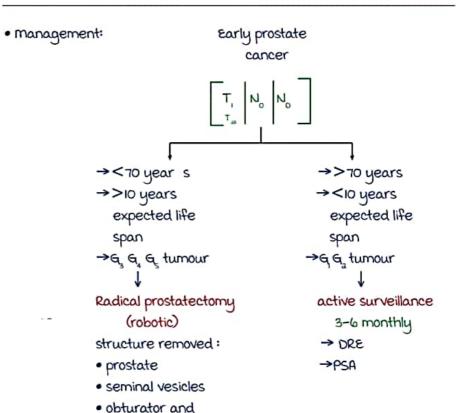
Stage	Definition	
Primary tumor		
TX	Primary tumor cannot be assessed	
TO	No evidence of primary tumor	
TI	Clinically, the tumor is neither palpable nor visible with imaging	
Tla	Tumor is an incidental histologic finding in 5% or less of tissue resected	
Tib	Tumor is an incidental histologic finding in more than 5% of tissue resected	
Tic	Tumor identified with needle biopsy (eg. because of an elevated PSA level)	
T2	Tumor confined within the prostate	
T2a	Tumor involves one-half of one lobe or less	
T2b	Tumor involves more than one-half of one lobe but not both lobes	
T2c	Tumor involves both lobes	
T3	Tumor extends through the prostate capsule	
T3a	Extracapsular extension (unilateral or bilateral)	
T3b	Tumor invades seminal vesicle(s)	
T4	Tumor is fixed or invades adjacent structures other than seminal vesicles: bladder neck, external sphincter, rectum, levator muscles, and/or pelvic wall	

· Partin Tables:

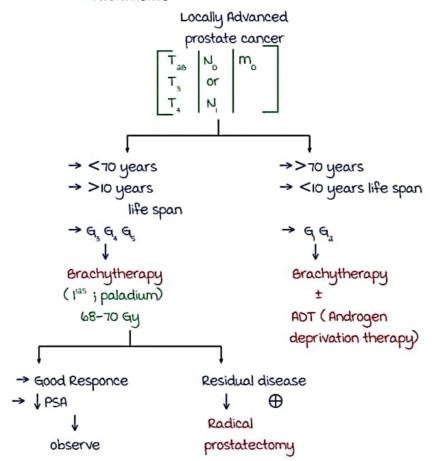
- → serum PSA
- → clinical stage
- → Gleason score
- → Risk of recurrence after radical prostatectomy
- · D'Amico classification:
- → serum PSA, clinical stage, Gleoson score
- → Risk of recurrence
- Jewett / Whitmore classification (old) → staging

Management of early and locally advanced prostate cancer

01:03:41



- impotence / erectile dysfunction
- sepsis
- incontinence

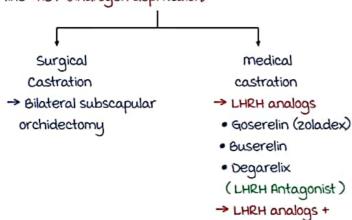


Management of metastatic prostate cancer

01:10:43

Anti androgens

- · mi disease
- First line : ADT (Androgen deprivation)

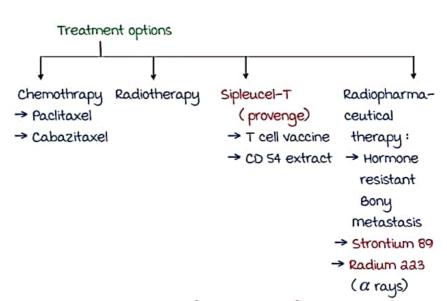


- · flutamide
- · Enzalutamide (xtandi)
- Abiraterone (zytiga)



ADT - Androgen Deprivation Therapy

in few years tumour becomes hormone resistant



Sac

Contents

Defect

HERNIA - 1

Definition:

Protrusion of viscus or part of it through wall containing it.

Uncomplicated hernia:

Reducibility and cough impulse.

obstructed hernia:

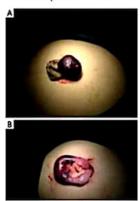
Irreducible and No cough impulse but

the blood supply is intact.

- obstructed hernia is also K/a incarcerated hernia.

strangulated Hernia:

Obstructed + compromised blood supply.



 Dictum: All obstructed hernias are strangulated unless proved otherwise.

Taxis:

- process of reduction of hernia
- forceful taxis should be avoided in obstructed and strangulated hernia

Based on the content of Hernia:

Omentocele

- · when omentum is the content.
- On inspection: No peristalsis
- On palpation : doughy consistency
- Easy to reduce first part, difficult to reduce second part.
- On percussion : Dull note
- On Auscultation : -
- If meckel's Directiculum is the content: Littre's hernia.
- Appendix: Amyand hernia.

Enterocele

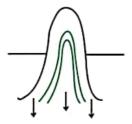
- · when bowel is the content
- on inspection: visible peristalsis
- Difficult to reduce first part.
 easy to reduce second part.
- Tympanic note
- · Bowel sounds.

Active space

Surgical management of hernias

00:13:10

1. Herniotomy:





- Identify the sac and push the -> If the sac is opened, close the contents inside.
- Highest Recurrence rate

Step a:

- sac and the defect remains
- like that.
- Herniotomy is the treatment of choice:
 - Congenital inquinal Hernia
 - Congenital Hydroceles.

a. Herniorrhaphy:

- Step $I + a + 3 \rightarrow$ Suture the two edges of the suture together.
- mc cause of failure: Increased tension in the repair
- Techniques :
 - · Bassini's
 - Shouldice
 - · mayo.
- Indications:
 - Infected /strangulated hernias.

3. Hernioplasty:

- Step 1 + 2 + 3 → Put a mesh over the defect.
- Its a tension free repair with least recurrence rate.
- Techniques :
 - · Lichenstein's tension free mesh hernioplasty.
- mesh materials :

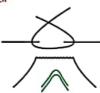


Synthetic

- Avoided when there is infection and strangulation
- Eg: proline mesh polyester Vipro - Vicryl + Prolene PTFE mesh - poly tetra fluoro ethylene



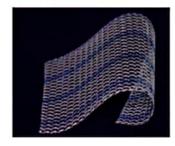
- Can be used when there is infection.
- Eq : Alloderm (Acellular Human Dermis)
- Acellular porcine dermis.





Synthetic mesh:

- Solid mesh
- Fixing is needed with sutures / staplers.



Net mesh

- Fibrous tissue grows through these pores
- They can remain in place without sutures being applied.
- · Better anchoring.

· mesh material:

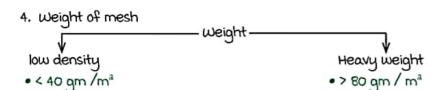
- · mc used: Prolene
 - Strong
 - Hydrophobic
- Polyester: Hydrophilic → Increased risk of infection. but due to rapid tissue in growth into the mesh, cellular defences prevent the infection.
- · PTFE: solid mesh
 - Adv: Does not become adherent to tissue. → No fistulas
 - It can be used in IPOm: Intraperitoneal placement of mesh.
 - modification: Fenestrated PTFE

3. mesh shrinkage

Upto 50% shrinkage can occur

Pt - experiences pain because of shrinkage

 A large mesh should be used, there should at least be 5 cm overlap on site of placement, so it doesn't give rise to pain.



Best mesh: • Low weight mesh

- · Thin fibers
- · Large pores

Comfortable for the pt. and less shrinkage

5. Plug mesh:

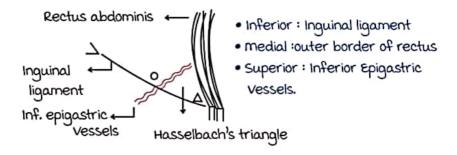
Disadvantage: MESHOMA - Excessive collagen deposition around



Inguinal hernia

00:32:15

- mc hernia in both males and females: Indirect Inquinal hernia.
- Hasselbach's triangle:



- Any hernia that comes lateral to the triangle → Indirect
- Through the triangle: Direct.

myopectineal orifice of fruchaud:

- Superior: Arching fibers of Internal oblique
- medially: outer border of Rectus
- Laterally: Tendon of iliopsoas
- Inferiorly: pectineal or cooper's ligament
- Inguinal, femoral and obturator hernias opens into this orifice. Clinical tests:
- single best test for Inquinal hernias Deep ring occlusion test.
- Ziemann 3 finger test) low sensitivity
- Ring invagination test
- Non palpable Hernias: USG
- a0% pt's can have occult C/L Inquinal Hernia.

management:

Surgery

Open

Laparoscopic

Herniotomy

· TEP

Herniorraphy

- · TAPP
- Bassini: suture conjoint tendon with reflected portion of Inquinal ligament.
- · Shouldice repair: 3 layered / 6 layered.
 - 1st layer: double breasting of fascia transversalis.
 - and layer: Double breasting of conjoint tendon with reflected inquinal ligament
 - 3rd layer: Double breasting of External oblique aponeurosis
- · and layer of shouldice corresponds to Bassini's repair.
- · Surgery of choice: Lichenstein's tension free mesh hernioplasty.

complication of open Inquinal Hernia surgery:

- Hemorrhage
- Injury to the vas/ cord structure.
- ullet mc nerve injured during open inguinal hernia $\mathbf{S}_{\mathbf{x}}$: Ilioinguinal Nerve
- mc nerve entrapped beneath the mesh: Iliohypogastric Nerve.

Chronic Inquinal pain.

- · Recurrence.
- Wound infection

Stoppa's repair

- Open preperitoneal repair.
- forms the basis for Laparoscopic TEP.

Laparoscope hernia repair

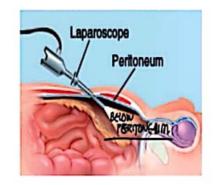
00:47:00

TEP

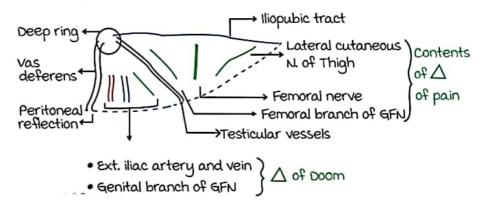
- Total Extraperitoneal Repair
- surgery done above the peritoneum.
- peritoneum is never breached
- Technically a better repair and more challenging.

TAPP

- Transabdominal preperitoneal repair.
- Surgery is done beneath the peritoneum & hence breached



- Lap repair is specially useful for
 - B/L inguinal hernias
 - Recurrent Inquinal hernias.
- During Lap repair two places where staples should not be applied.
 - Triangle of Doom
 - Triangle of pain



 mc nerve entrapped in laparoscopic surgery: Lateral cutaneous nerve of thigh.

meralgia Paresthetica.

- Triangle of pain is also K/a Electrical hazard zone.
- Triangle of Doom (medial) >
- Trapezoid of Disaster. Triangle of pain (Lateral)

Corona Mortis / Circle of death

00:55:00

 Abnormal communication b/w external and internal Iliac systems Internal Iliac External Iliac Aberrant Inferior Epigastric artery obturator artery obturator Lies close to the pubic tubercle Torrential hemorrhage during laparoscopic surgery Classifications of Inquinal hernias:

- Gilbert
- · Nyhus
- · European hernia society classification:
 - P primary Hernia

R - Recurrent

• L - Lateral / Indirect

m - medial / direct

F- Femoral Hernia

Defect - is measured in finger breadths.

- I finger breadth = 1.5 cms of defect

Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with Marrow Edition 4 videos.

Special types of inguinal hernias

00:59:05

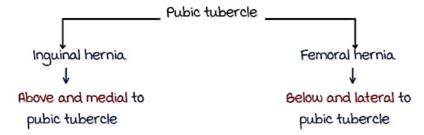
- 1. Gibbon Hernia: Inquinal Hernia + Hydrocele.
- 2. Pantaloon Hernia: Direct + Indirect Hernia.
- 3. Sliding Hernia: Hernia en Glissade
 - Commonly seen in elderly males
 - The posterior boundary of the sac is formed by a visceral structure.
 - mc on left side > Rt . side
 - mc structure implicated : Sigmoid colon > Bladder.
- 4. Sportsman hernia:
 - Also K/a Gilmore groin
 - Athletes
 - Severe inquinal / groin pain
 - Occurs d/t tear in the posterior wall muscle.
 - Sometimes a very small Hernial sac can be there.
 - Usually Non palpable.
 - 10C : MRI
 - mx: Rule out other causes of inguinal pain

Laparoscopic inguinal hernia surgery is done. Pain may not resolve even after the surgery.

HERNIA - 2

Femoral hernia

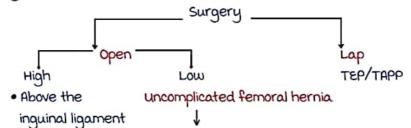
- · Comes out through the femoral ring
- Superior: Inguinal ligament
- medial: Lacunar ligament
- Lateral: Septum which separates it from the femoral vein.
- Posteroinferior: Pectineal/Cooper's ligament
- High chances of obstructions and strangulation in femoral hernia as the ring is surrounded by rigid structures.
- · Can be associated with Richter's hernia
- F > m, Elderly low weight females are more commonly affected.
 On Examination:



Differential diagnosis of femoral hernia:

- Inguinal hernia.
- Psoas abscess.
- Inguinal lymph node.
- Saphena Varix.

management



- Better exposure. Lockwood's Repair
- Obstructed /strangulated hernias



55

Special types of femoral hernias:

- 1. Laugiers hernia:
 - · Occurs through lacunar ligament.
 - · Prone to strangulation.
- a. Narath's hernia:
 - Femoral hernia seen in patients with CDH (Congenital dislocation of hip).
- 3. Serafini's hernia:
 - Retrovascular Hernia, lies behind the femoral hernia: posterior to femoral vessels.
- 4. Velpeau hernia:
 - · Prevascular hernia, lies anterior to femoral vessels.
 - All these 4 special types are prone to strangulation.

ventral hernias:

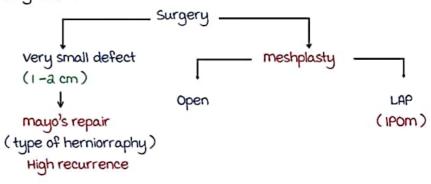
- · means abdominal wall hernia.
- 1. Epigastric
- a. umbilical / Paraumbilical
- 3. Spigelian
- 4. Traumatic
- 5. Lumbar
- 6. Parastomal.
- 7. Incisional mc ventral hernia.

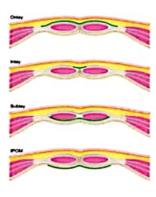
Incisional hernia

00:10:35

- Develops in the region of incision.
- 30-50% open abdominal surgeries develop incisional hernia
- 1-5% laparoscopic surgeries → develop incisional hernia.
- Usually a large defect → Strangulation not common
- · obstruction can occur due to adhesions.

management:





Onlay: mesh placed on top of anterior rectus sheath.

Inlay: At level of anterior rectus sheath. (or) between anterior sheath and muscle.

Sublay: Between posterior sheath and peritoneum in preperitoneal Space.

IPOM: Intraperitoneal placement of mesh (Tissue separating mesh: Polytetrafluoroethylene mesh)

- Tissue repairs like keel and de Silva are preferred these days.
- Ramirez component separation technique done if incisional hernia. volume is > 25% of abdominal volume.

Relaxing incisions are made laterally in the external oblique aponeurosis

Avoids the loss of abdominal domain.

Epigastric hernia

00:19:08

- A/K/A fatty hernia of linea alba
- mc in young fit males.(m>F)
- It can occur anywhere between xiphisternum and umbilicus
- · Usually in midline
- Single /multiple defect.
- Not identifying the multiple defect
 - → mc cause of recurrence.
- Transverse split in the median raphe

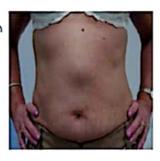


mc structure which herniates: Preperitoneal pad of fat

Clinical features:

- Swelling
- cough impluse
- pain similar to peptic ulcer.

management: Same as incisional Hernia.



488

Umbilical / paraumbical hernia

00:22:52

umbilical

- Causes eversion of the umbilicus
- Large defect: obstruction and strangulation are uncommon.
- Newborn High incidence in premature babies
- 8 times higher incidence in black babies
- Umbilical hernia in Newborn

Conservative management (2-3 yrs)

- If Hernia persists after 2-3 years, surgery is done.
- Umbilical hernia is also seen in Cirrhosis / massive ascites

Paraumbilical

- Umbilicus forms one of the boundaries of the defect
- Narrow defect: obstruction, strangulation and Richter¹s hernia-common. So,early surgery done.
- Defect is usually superior and right sided
- F>m
- · more common in obese patients
- management: Early surgery.

Omphalocele and gastroschisis

00:28:06

Omphalocele



- Defect through the umbilicus in which bowel fails to return inside.
- · Bowel covered with peritoneal sac.

Gastroschisis



- Defect adjacent to the umbilicus
- Bowel is not covered with peritoneal sac.
- Bowel exposed to environment

dry, inflamed & gets perforated

Narrow defect

 Large defect, So liver can also herniate



- Associated With Beckwith-Wiedemann syndrome
- Chromosomal: Trisomy 13, 18, 21 management:
- associated Atresia and perforation are

No congential anomalies

- common
- Done by creating a SILO → Gradual reduction of abdominal contents

Lumbar hernia

00:35:04

- · 20 > 10
- 1º lumbar hernias are rare
- aº lumbar hernia: Post renal Surgery Trauma

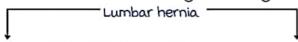


Differential diagnosis:

- Lipoma.
- Pseudohernia muscle bulges out due to weakness.

Injury to subcostal nerve during renal surgery.

Lumbar hernia comes out through two triangles.



- Inferior Lumbar triangle of Petit
 Superior Lumbar triangle of Grynfeltt
- majority of hernias
- Boundaries:

inferiorly: Iliac Crest

Laterally: External oblique

medially: Latissimus dorsi

- Superiorly: 12th rib
- Laterally: Internal oblique
- · medially: Sacrospinalis

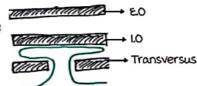
management:

- Open or laparoscopy
- Dowd-ponka repair

Spigelian hernia

00:38:16

- A/K/A Intraparietal hernia
- Defect in Spigelian fascia.
- Sometimes it can pass through internal oblique as well.
- mc location : Below umblicus and above arcuate line.



 In young patients: Defect is narrow; there can only be preperitoneal fat.

- In Adult : large sac
- These hernias are usually detected late, as Swelling is not palpable management : Open or laparoscopy

Obturator hernia

00:42:43

- A/K/A Little old lady's hernia
- Common in Elderly, multiparous Woman
- Narrow defect → Increased chances of strangulation & Richter's hernia.

Clinical Features:

- · Pain
- Hip flexed
- Swelling in the Scarpa's triangle can be missed because it is covered by pectineus
- On digital rectal or pervaginal examination: A tender swelling can be felt
- Howship-Romberg sign:

Abduction and medial rotation



Shooting pain along the obturator nerve management: Open or laparoscopic (Lap will be TAPP repair)

Richter's hernia

00:45:39

- Can be seen in femoral hernia, paraumbilical hernia and obturator hernia
- very narrow defect



Only portion of circumference of bowel herniates

Strangulation occurs and detected late

Initial features: Similar to Gastroenteritis

Maydl's hernia

00:47:43

- Very large defect
- more than one loop of bowel herniates
- "w" shaped hernia

strangulation

If strangulation occurs

First affected: Connecting portion



Congenital diaphragmatic hernia

00:49:17

Bochdalek

- · mc: 65 70 %
- left posterolateral hernia.
- · Occurs due to defective development · Defective development of of pleuroperitoneal canal or membrane.
- Contents: Stomach, Spleen and transverse colon.

morgagni

- right anteromedial
- central tendon of diaphragm
- · mc: transverse colon



Defect in diaphragm

Bowel will be present in thorax

Pulmonary hypoplasia - mc cause of death

Hypoxic vasoconstriction of pulmonary vessels

Pulmonary hypertension - and mc cause of death

Clinical features:

- mothers develop polyhydramnios
- Scaphoid abdomen
- Respiratory distress
- Dextrocardia
- In child
- If Ryle's tube insertion is attempted, it gets coiled up in the stomach and seen in thorax.

management:

- Bag and mask ventilation.— Contraindicated
- Best: IPPV (Intermittent positive pressure ventilation)
 - ↓ if fails

ECMO (Extracorporeal membrane oxygenation)

Inhaled nitrates for pulmonary hypertension

Definitive management :

Surgery - Circumferential incision over the Diaphragm

Reduce the contents and close the diaphragmusino mesh.

- · Stammer's hernia.
- · Petersen's hernia

Left paraduodenal hernia:

- Through fossa of Landzert
- · Develops due to defective fusion of Descending colon mesentry.
- lies behind inferior mesenteric vessels.
- Left paraduodenal hernia is more common than Right duodenojejunal hernia.

Right duodenojejunal hernia:

- · Defective fusion of ascending colon mesentry.
- · Lies behind the superior mesenteric vessels.

Mesentry

00:59:09

mesenteric cyst:

- · Presents with Tillaux triad.
- · Periumbilical swelling
- moves at right angles to attachment of mesentry but not along the line of attachment of mesentry.
- Transverse band of resonance over the swelling

IOC : CECT

Types of mesentric cyst:

- Chylolymphatic cyst mc
- Enterogenous cyst
- Dermoid

Chylolymphatic cyst

Enterogenous cyst

- · mc
- Sequestered lymphatic tissue
- It has independent blood supply
- Thin walled with clear fluid
- Sequestered bowel tissue
- Shares blood supply with bowel
- Thick walled with turbid fluid

management:

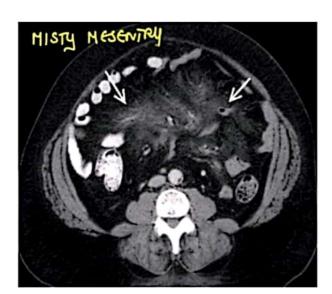
Enucleation

Resect and anastomosis.

misty mesentery:

Seen secondary to pancreatitis, edema, cancer, hemorrhages.

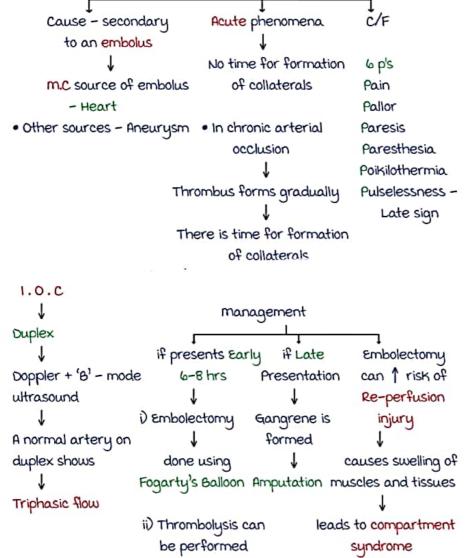
- Should not be confused with mesenteric panniculitis.
- mesenteric manifestation of weber-Christian disease is called as mesenteric panniculitis
- Misty mesentry means increased fat attenuation on CT.



ARTERIAL DISORDERS

Acute arterial occlusion

00:00:30



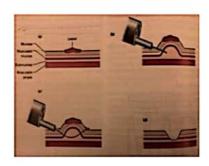


Acute arterial occlusion

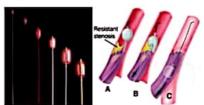
Active spac

management -Fasciotomy

So fasciotomy is prophylactically performed







Chronic arterial occlusion with collaterals

Chronic arterial occlusion

00:06:01

- Cause Secondary to thrombus.
 - thrombus grows gradually

there is time for the formation of collaterals

Advantage - some area distal to thrombus survives on complete obstruction.

- · C/F Intermittent claudication
 - Cramping pain on walking certain distance
 - Pain is felt in muscle below the block m.c site calf muscle

Boyd classification of intermittent claudication

class 1 - Pain on walking, but pain & on continuation of walking

class 11 - Pain on walking, continues to walk despite the pain

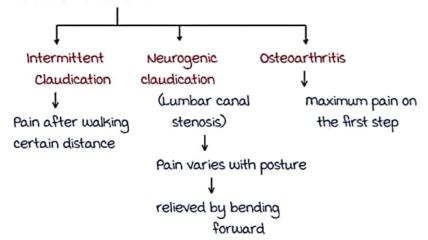
class III - Pain forces the patient to stop walking

class IV - Pain at rest

Fontaine and Rutherford classification of claudication

FONTAINE		RUTHERFORD		
Stage	Clinical	Grade	Category	Clinical
ı	Asymptomatic	0	0	Asymptomatic
lla	Mild claudication	1	1	Mild claudication
llb	Moderate-severe claudication	- 1	2	Moderate claudication
		1	3	Severe claudication
III.	Ischemic rest pain	II	4	Ischemic rest pain
IV	Ulceration or gangrene	III	5	Minor tissue loss
		IV	6	Ulceration or gangrene





Other C/F - Arterial ulcer
 Gangrene
 Loss of muscle volume
 Sparse hair

Chronic arterial occlusion - investigations

00:12:34

- 1.0.C Duplex scan.
- ABPI Ankle brachial pressure index

maximum systolic BP at ankle

maximum systolic BP at brachial artery

0.9-1.3 - Normal

40.9 - Intermittent claudication

<0.5 - Rest pain

<0.3 - Critical Limb ischemia / Imminent necrosis

>1.3 - Calcifled vessels in diabetic nephropathy

- Gradually ↓ ABPI Sign of imminent limb loss
- For every 0.1 ↓ in ABPI below 0.9 Risk of cardiac mortality ↑ by 10%
- · If Resting ABPI is normal

Still suspecting arterial disease.

Check post exercise ABPI

If there is a rate limiting arterial disease

Fall of post exercise ABP1 more than 20% as compared to resting ABP1

Leriche syndrome

- Cause block at the aortic bifurcation
- C/F earliest manifestion Gluteal claudication Impotence

Buerger's Disease and Atherosclerosis

00:18:55

Buerger ¹ s disease (Thromboanqiitis obliterans)	Atherosclerosis
 occur in 3rd/4th decade males > Females Risk factor - Smoking Involves lower limb > upper limb Involves Artery, vein, nerve C/F - superficial thrombophlebitis Neuropathy Arterial blockade 	 occur in ≥ 5th decade males = Female Involves lower limb > upper limb Involves artery Involves large to medium size vessels Spread - proximal to distal
 Involves small to medium size vessels Spread - Distal to proximal No distal target vessel / Distal vessel is narrow No role for Eupass grafting 	 Bypass grafting and stenting has a role in treatment of atherosclerosis

Management of buerger's disease

00:23:24

- 1. Quit smoking
- a. Drugs Equivocal role
- 3. Omentoplasty No role
- 4. Conservative amputations
- 5. If pain present

Lumbar Sympathectomy

зk

Indicated only in rest pain

Contraindicated in intermittent claudication

- Chemical sympathectomy preferred
- If B/L lumbar sympathectomy is done

Spare L1 ganglion on one side

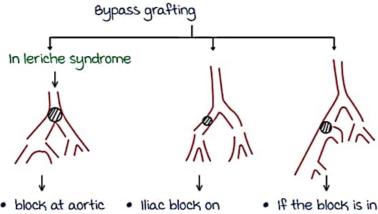
Otherwise - cause impotence in males

- m.c structure confused with lumbar sympathetic chain genitofemoral oral nerve
- On Angiography Corkscrew collaterals seen.

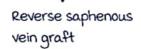
Management of atherosclerosis

00:28:56

- Bypass grafting or stenting
- Angioplasty ileofemoral disease (preferred) not for blocks beyond this
- Results with bypass grafting is better compared to Angioplasty



- bifurcation
- one side
- Aortobifemoral Grafting is done . m.c graft-Dacron
- Supra inquinal grafts - m.c graft - Dacron
- femoral artery Aortofemoral grafting is done
 - Ilio popliteal grafting is done
 - It is infrainguinal graft Best synthetic material



(Polytetrafluoro ethylene) (PGI, JIPMER)



Aneurysms

00:33:43

- m.C vessels involved with aneurysms circle of willis
- m.c extracranial vessel infrarenal abdominal aorta

- m.c peripheral vessel Popliteal artery
- m.c visceral vessel Splenic artery
- m.c vessel with mycotic aneurysm Aorta
- m.c organism in mycotic aneurysm S. aureus
- m.c vessel involved in pseudoaneurysm femoral artery

Abdominal aortic aneurysm

- m.c site- Infrarenal abdominal aorta
- most important risk factor- Atherosclerosis

Screening

- Starts at 65 yrs.
- Ultrasound abdomen

Critical diameter

- i) for abdominal aortic aneurysm-5.5cm 1 chances of rupture Surgery is carried out even in asymptomatic patients
- ii) For ascending thoracic aortic aneurysm-5.5cm \rightarrow if 0.5 cm \uparrow /per

Indication for surgery

- iii) For descending thoracic aortic aneurysm- 6.0cm → if 1cm 1/per yr indication for surgery
- iv) In marfan patients thoracic aortic aneurysm 4.5 5cm is the critical diameter
- Chances of rupture are higher in females

Abdominal aortic aneurysm - clinical features, management 00:39:34

C/F - Asymptomatic

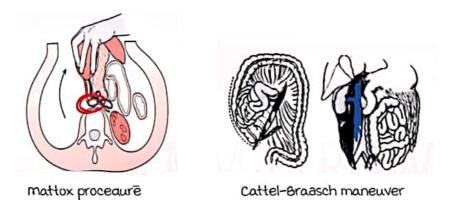
Lump in abdomen Pain

Act as source of embolus - Blue toe syndrome

- If Rupture Very high mortality m.c site - Left retroperitoneum
- I.O.C CT angiography
 - management In all symptomatic or

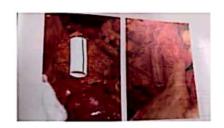
Abdominal aortic aneurysm - surgery - open and EVAR 00:41:50

Open	EVAR	
• To expose the aorta	The device has three parts	
. ↓	body, limbs, hooks	
mobilise the descending color		
medially	 Hooks - help in anchoring the 	
↓	graft to aorta	
known as left medial visceral	↓	
rotation	keeps in position	
↓ ↓		
mattox procedure	 these patients - monitored life 	
 If right ascending colon 	long	
mobilized	↓	
medially- Right medial visceral	due to complication— Endoleaks	
rotation - cattel-braasch maneuver		



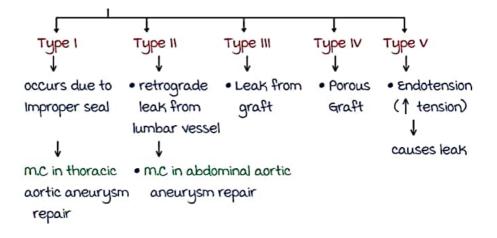
Note: If duodenum is mobilised, then it is called as Kocherization





Open Surgery TYPE IV

Types of endoleak



Abdominal aortic aneurysm - complications following surgery 00:47:34

- 1) Cardiovascular causes leading cause of death
- a) Renal failure
- 3) Aortoduodenal fistula
- 4) Colonic ischemia m.c on Left side

manifests as bloody stools (+)

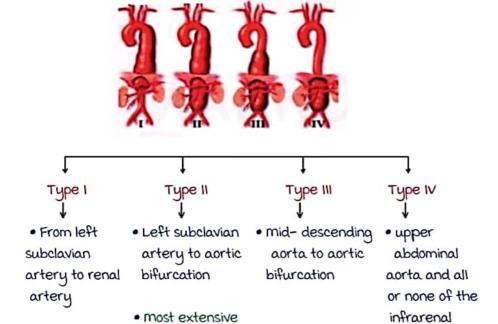
5) paraparesis- involvement of Artery of adamkiewicz

supplies anterior spinal artery

Thoracoabdominal and thoracic aortic aneurysms

00:50:03

Crawford classification of thoracoabdominal aortic aneurysm



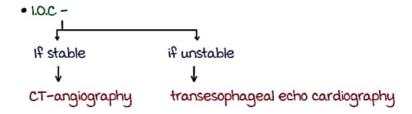
Thoracic aortic aneurysms

- Risk factors Atherosclerosis
 marfan syndrome
 Ehler danlos syndrome
- Clinical features Asymptomatic
 Due to mass of aneurysm compressive symptoms- Hoarseness
 Dyspnea
 Dysphagia
- If it ruptures Left pleural effusion
- · Associated with progressive aortic valve insufficiency
- on x-ray mediastinal widening seen
- · 1.O.C CT Angiography
- Management Dacron graft repair

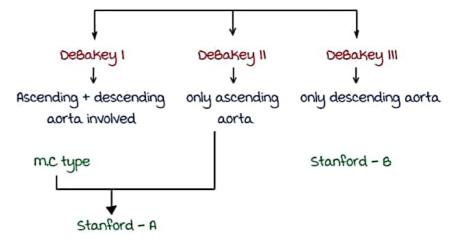
- A tear in intimal layer and blood enters between intima and media.
- · most important risk factor-hypertension
- · m.c site-lateral wall of ascending thoracic aorta
- · C/F Earliest chest pain

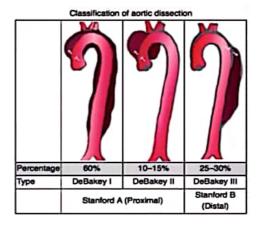
radiates to back

- · If aortic root is involved myocardial infarction
- Renal failure
- Left pleural effusion



Classification of aortic dissection









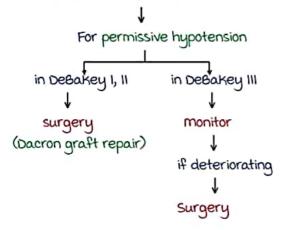
on x-ray - widening of mediastinum

on CT.

Management of aortic dissection, popliteal aneurysm, femoral aneurysm 00:58:39

Aortic dissection- management

Ist line- Beta blocker - esmolol



Popliteal aneurysm

- m.c peripheral vessel aneurysm
- Critical diameter-acm

surgery even if asymptomatic

- Seen in males
- 50% can be bilateral

Femoral pseudo aneurysms

- · Cause trauma, angioplasty or angiography m.c.c
- If the aneurysm is > 3cm < 3cm Thrombin injection Surgery

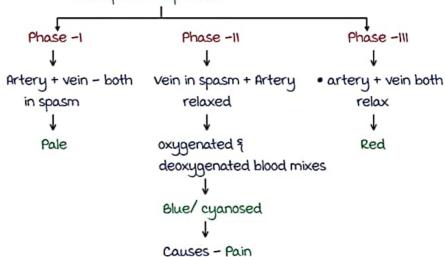
- Raynaud's disease- Associated with collagen vascular diseases
- Raynaud's phenomena

m.c in - people using vibrating tools

A/K/A vibration hand



Vasospasm - 3 phases



- management • Avoid precipitating factors vibrating tools, cold environment
 - · Calcium channel blockers D.O.C

Acrocyanosis

- Seen in Females
- Painless
- Episodic
- mottled cyanosis → parasthesias

· Types of AV fistula

- i) Traumatic
- ii) latrogenic m.c in Renal dialysis

Known as Cimino fistula

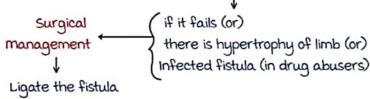
Between radial artery and cephalic vein

- iii) Congenital Beckwith Wiedemann syndrome Sturge weber syndrome Klippel - trenaunay syndrome
- · If a congenital fistula is present in a limb causes hypertrophy of limb
- C/F pulsatile swelling
 High output state high output cardiac failure
- On examination Bruit (+)
- · Nicoladoni Branham sign- on pressing feeding vessel.

Size ↓
Pulse rate ↓
systolic BP ↓
Bruit ↓

- · 1.0.c MR angiography
- management- if asymptomatic no management

if symptomatic - 1st line- Angioembolization



Subclavian steal syndrome, carotid artery stenosis

01:12:28

Subclavian Steal syndrome

- Stenosis / blockade in first part of subclavian artery
- On physical exercise → Reverse flow from vertebral artery

Causes Dizziness / syncope

- · m.c.c atherosclerosis
- Diagnosis CT angiography
- management Angioplasty

Leave Feedback

Carotid artery stenosis

- · m.c site of block at bifurcation
- · m.c.c atherosclerosis
- C/F transient ischemic attacks warning sign for major stroke
 Sensoru Motor Amaurosis (transient blindness)
- Diagnosis Duplex scan

Indications for surgery

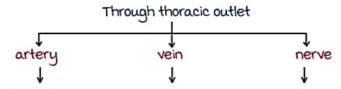
70% or greater carotid stenosis

- Ipsilateral amourosis fugax or monocular blindness
- contralateral facial paralysis or paresthesia
- Arm / leg paralysis or paresthesia
- Hemianopia
- Dysphasia (if dominant hemisphere)

Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with Marrow Edition 4 videos.

Thoracic outlet syndrome

01:16:22



Subclavian artery

subclavian vein

Brachial plexus

 Causes – cervical Rib arthritis

Tumor

C/F - If subclavin artery - compressed - ↓ pulse Embolic phenomena

If subclavian vein - compressed - swelling of upper limb If brachial plexus - compressed - m.C involved - ulnar

distribution

1.O.c - Ct angiography

Test	Maneuver	Result
ADSON TEST	Affected arm is abducted 30° at the shoulder while maximally extended. While extending the neck and turning head towards ipsilateral shoulder, patient inhales deeply	Decrease or absence of ipsilateral radial pulse
Elevated Arm Stress Test (EAST) or ROOS	Arms are placed in the surrender position with shoulders abducted to 90° and in external rotation, with elbows flexed to 90°. Patient slowly opens and closes hand for 3 min	Precipitates pain, paresthesias, heaviness or weakness
Upper Limb Tension Test (ULTT) or ELVEY	Position 1: arms abducted to 90° with elbows flexed Position 2: active dorsiflexion of both wrists Position 3: head is tilted ear to shoulder, in both directions	Positions 1 and 2 elicit symptoms on the ipsilateral side, while position 3 years elicits symptoms on the contralateral side

Wright / hyper abduction test - when the arm is abducted

if no symptoms

hyper abduct - if symptoms (+) or
pulse \(\ - \) indicates

Thoracic outlet syndrome

management – if cervical rib (+) → Resection
 majority – respond to – physiotherapy

VENOUS SYSTEM

Deep vein thrombosis

00:00:20

Virchow triad:

Stasis

Hypercoagulable

Risk factor:

- 1. Previous h/o DVT
- a. Immobilization
- 3. Protein C and S deficiency
- 4. Factor 5 (Leiden mutation)
- 5. Pregnancy
- 6. malignancy
- 7. Trauma
- 8. Surgery
- 9. May Thurner Syndrome: Right iliac artery presses on left iliac vein .

Phlegmasia Cerulea Dolens.

Painful blue limb.

Thrombosis of major

Axial veins +

involvement of collaterals.



Endothelial injury

Phlegmasia Alba Dolens

Painful white limb (aka milk leg)

Thrombosis of major axial veins but collaterals spared.

m.c veins affected with DVT → Calf / Soleal veins

m. c DVT to cause pulmonary embolism \rightarrow Iliofemoral veins .

Clinical features:

Pain (m. c and earliest)

swelling

If pulmonary embolism (+) -> Chest pain, respiratory distress.

Surgery • v2.0 • Marrow 4.0 • 2020

Signs: Limb edema.

Homans Sign: Resistance / Stiffness on dorsiflexion of foot.

moses Sign: Pain when calf is squeezed.

10C: Duplex scan

Clinical scoring: modified well's score.

Management of DVT

00:09:30

Anti coagulation.

First 5 days: LMWH + Warfarin.

After 5 days: Only Warfarin.

First episode → Anti - coagulation for 3 months

Recurrent DVT → Life long.

Warfarin monitoring → INR (International Normalized Ratio)

INR = PT (patient)
PT (control)

Target INR = a - 3

Clinical case:

Young patient with DVT on Warfarin Therapy.

Presents with symptoms of appendicitis.

can be taken up for

Fastest way to ↓ INR 4

surgery

max acceptable INR at which surgery can

be done: 1.4.

Prothrombin Factor Fresh frozen

Concentrates plasma.

Note:

Patient sensitive to Heparin → Fondaparinux

(Factor Xa inhibitor)

→ Bivalirudin

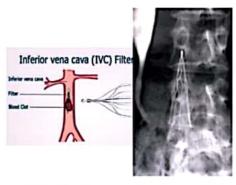
(Direct Thrombin Inhibitor)

Novel anti- coagulants (NOAC)

Direct Xa inhibitors

- Rivoroxaban
- Apixaban.

Dente opac



K.a. Greenfield filters.

Indications:

- 1. Anticoagulation contraindicated
- a. Pulmonary embolism despite anticoagulation
- 3. Persistent Pulmonary hypertension.

Dissolution of clots:

- Urokinase
- Streptokinase.

Note:

a/3rd patients with DVT

Develop post—thrombotic leg within 5 years

venous hypertension

- varicose veins
- Lipodermatosclerosis.
- Ulceration

POST THROMBOTIC LEG



Prevention of DVT

Pharmacological methods

- · LMWH
- · NOAC

- mechanical methods
- Early ambulation
- Pneumatic compression stockings

Risk assessment in DVT

00:21:20

Low risk: → Only mechanical prophylaxis

Minor surgery < 30 minutes; any age; no risk factors major surgery < 30 min; age < 40; no other risk factors minor trauma or medical illness.

moderate risk:

major surgery; age 40+ or other risk factors

major medical illness: heart / lung disease, cancer, inflammatory

bowel disease.

major trauma/burns

minor surgery, trauma, medical illness in patient with previous DVT, PE or thrombophilia.

High risk:

major orthopaedic surgery or fracture of pelvis, hip, lower limb.

major abdominal / pelvic surgery for cancer

major surgery, trauma, medical illness in patient with DVT, PE or thrombophilia.

Lower limb paralysis (eq: stroke, paraplegia)

major lower limb amputation.

moderate and high risk \rightarrow Pharmacological + mechanical prophylaxis.

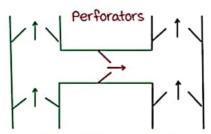
Surgical anatomy of venous system

00:23:30

Surgical anatomy of venous system of lower limb:

Superficial venous System (ao%)

Deep venous system (80%)



unidirectional flow of blood guarded by valves

Superficial veins

Great Saphenous vein (GSV)

(SSV) Short Saphenous Vein

medial end of dorsal arch

Lateral end of dorsal arch

Lies anterior to medial malleolus

(Site for venous cut down)

Runs posteriorly between a heads of gastrocnemius

medial aspect of knee

Drains into Saphenopopliteal

Drain into Saphenofemoral Junction

Junction (SPJ)

57 system

Saphenofemoral junction:

- constant
- 4cm below \(\) lateral to pubic tubercle

Saphenopopliteal Junction:

variable location.

GSV -associated with

Saphenous nerve below the knee

: If vein stripped below knee → nerve injury

Associated with sural nerve all along its course

Anterior saphenous vein (ASV) Lateral aspect of knee Drains into GSV.

vein of Giacomini Posterior extension of Snort saphenous vein drains into GSV

Perforators (100/150)

- SFJ → Largest
- Dodd → Above knee
- Boyd → Below knee
- Hunterian → Thigh
- 3 Cockett → 5, 10, 15 cm above medial malleolus.
- may / Kuster → Heel.

Varicose veins

00:31:50

Dilated tortuous veins with defected valves

Risk factors:

- I. Post DVT
- a. Defective valves
- 3. 1 BMI
- 4. Female > males
- 5. Pregnancy
- 6. Klippel Trenaunay syndrome
- 7. Prolonged standing
- 8. Family history

Clinical features:

- a) Asymptomatic
- b) Dilated veins:
 - > 3 mm -> Varicose veins
 - 1-3 mm → Reticular veins
 - < 1 mm → Thread veins/ Dermal flares [Cosmetic blemish]</p>
- c) Pigmentation (due to hemosiderin)







- d) Lipodermatosclerosis
 - shiny skin
 - obliteration of fat
 - contractures.

woody feel of the limb

Inverted champagne bottle appearence Early feature of varicose venis

- e) Corono phlebectatica / malleolar flare.
 - Thread veins around medial malleolus
 - Early sign of advanced venous disease.



f) Atrophie Blanche White area surrounded by dermal flares





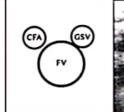
Classification and diagnosis of varicose veins

00:37:50

CEAP classification:

Clinica	al Classification (C)	Etiolo	gic Classification (E)
C _o	No visible/palpable signs of venous disease	E,	Congenital Primary
C,	Telangiectasias or reticular veins	E,	Secondary (postthrombotic)
C,	Varicose veins	E.	No venous etiology identified
c,	Edema	Anato	mic Classification (A)
C4.	Pigmentation and/or eczema	A.	Superficial veins
		A.	Perforator veins
C _{4b}	Lipodermatosclerosis and/or atrophy	A,	Deep veins
C.	Healed venous ulcer	A_	No venous location identified
C.	Open venous ulcer	Pathophysiologic Classification (P)	
		P,	Reflux
	Subscript	P.	Obstruction
A	Asymptomatic	Pea	Reflux and obstruction
s	Symptomatic	P.	No venous pathophysiology identifiable

10C: Duplex scan - mickey mouse view





57

Clinical signs:

Low sensitivity

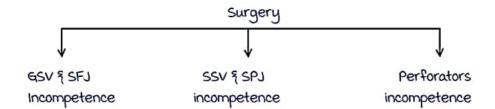
- 1. Trendelenburg test
 - To detect competence of SFJ and perforators
- a. modified Perthe's test
 - if DVT (f) or not
- 3. multiple Tourniquet test) Detect site of incompetent
- 4. Fegan method

perforators

- 5. Pratt's test incompetence of vein
- 6. morrissey's cough impulse SFJ incompetence.

Management of varicose veins

00:44:10



GSV and SFJ incompetence

Trendelenburg procedure

- · Flush ligation of SFJ. (ligate GSV as close to femoral vein as possible).
- 6 tributaries of GSV to be ligated literally Superficial circumflex iliac vein Superficial epigastric vein

medially

Superficial external pudendal Deep external pudendal

Distally

Accessory anterior saphenous vein Posterior medial thigh vein Stripping → additional procedure → done only upto the knee ost, y troccasio dy choled for que incompetence

OR RFA

(Endovenous Laser Therapy)

(Radio frequency ablation)

- · 1470 nm .
- Heat generated → 601/cm
 causes closure of veins
- Iao° c
- · ao sec cycle.

Advantage:

EVLT can be used in any vein including perforators

Advantage:

Standardized management

Safe

Shorter learing curve.

Short saphenous vein incompetence

00:50:30

SSV x SPJ incompetence

1. Flush ligation of SPJ.

a. No stripping [to avoid injury to sural nerve]

Procedure of choice → EVLT or RFA

Perforator incompetence

I. Traditional → Dodd & Cockett Procedure Multiple subfascial ligation of perforators Cosmetically inferior

a. SEPS (Subfascial Endoscopic Perforators Surgery)

3. Latest → EVLT or RFA

Other treatment modalities:

- a) Compression garments → Adjunct to surgery
- b) Trivex -> Subcutaneous illuminator.
- c) Endovenous glue therapy \rightarrow Cyanoacrylate glue
- d) Foam sclerotherapy

veins < 3 mm in diameter

m. c sclerosing agents: Sodium tetradecyl sulphate

Other sclerosing agents: Polidocanol

Ethanolamine oleate

Sodium morrhuate

Foam created so that: Larger area can be covered, better obliteration, less sclerosant used.

Tessari method → used to create foam

Sclerosant: Air → 1:3 or

in one attempt → 10-12 ml sclerosant used.



Disadvantage of foam sclerotherapy → 1 complications & recurrence

Complications of varicose veins surgery: most common - Wound infection Bruising Injury to femoral vessels Injury to nerves

Recurrence

Complications of varicose veins

00:58:20

- 1. Bleeding
- a. Calcification
- 3. Pigmentation
- 4. Lipodermatosclerosis
- 5. Venous ulcer / varicose ulcer most acceptable theory: Ambulatory venous hypertension theory m. c location -> medial malleolus / Gaiter area.

Features:

Shallow ulcer

Sloping edges

Pale granulation tissue in floor

pigmentation margins

Tendency to become non-healing

management:

Bisgaard regime

 $\varepsilon \rightarrow \varepsilon ducation$

 $\varepsilon \rightarrow \varepsilon$ levation of limb

∈ → Elastic compression stockings (grade III)

Grade 1:14 - 17 mm Hq 11:18 - 24 mm Hg

111: 25 - 35 mm Hq.

Regular dressings - VAC dressing

Antibiotics → avoided

Surgery for varicose veins done.





```
Long - standing venous ulcers / burn scars

marjolin ulcers
(Squamous cell carcinoma)

Everted edges

management:
```

Radiotherapy → not effective.

Klippel Trenaunay syndrome

Surgery.

01:05:20

```
Mesodermal abnormality

Non - familial

Varicose veins (+)

Vestigial veins (+)

Soft tissue & bony hypertrophy

naevus

D/D: Park Weber Syndrome

Varicose veins

Haemangiomas

A - V fistulae

High output cardiac failure.

management of Klippel Trenaunay:

Compression stockings

LMWH (if patient is undergoing surgery)
```

Axillary vein thrombosis

- aka Paget Schroetter disease
- · develop after exercise of arm.
- Seconary to Cervical rib thoracic outlet syndrome

```
Features: Swelling and Pain of arm.
10C: Duplex scan
```

```
management:
```

```
Early -> Thrombolysis.

Anticoagulation.

Surgery for cervical rib (if it is the cause)
```

LYMPHATIC SYSTEM

Acute lymphangitis

00:00:07

- Inflammation & infection of lymphatic vessels
- Causative agents : S. pyogenes , S. aureus
- Clinical features Pain & Inflammation.
- On examination: Red streak running along the lymphatic vessels
- management : Rest
 - Limb elevation
 - Iv antibiotics
 - If patient don't respond for 48 hrs/pus⊕





- If not managed adequately → Chronic lymphedema

Lymphedema

00:01:50

- Accumulation of excessive interstitial fluid involving the limbs, usually due to defective drainage
- Types,
 - Primary
- Lymphedema congenita: Seen since birth till ayr of age
- Sporadic or familial —Nonne milroy syndrome (FLT-4/VEGF)
- 0" > 2, Bilateral (entire limb & face)
- Lymphedema praecox: 2 35 yr age;
- · mc 1° lymphedema.
- Unilateral, seen in legs (upto knee)
- Sporadic or Familiar(meige syndrome)
 (GJC a gene)
- · 0 > 0
- -• Lymphedema tarda : > 35 yr age

- Secondary . mc overall
 - · mc cause of upper limb lymphedema Post mastectomy
 - mc cause of lower limb lymphedema Filariasis

Other course → - a° to Radiotherapy

- Lymph node dissection
- Lymphangitis
- ao to cancer

Clinical features:

Brunner's classification

Clinical Classification of lymphedema

Subclinical (latent)	There is excess interstitial fluid and histological abnormalities in lymphatics and lymph nodes, but no clinically apparent lymphedema
I	Edema pits on pressure and swelling largely, or completely disappears on elevation and bed rest.
II	Edema does not pit and does not significantly reduce upon elevation
Ш	Edema is associated with irreversible skin changes, i.e. fibrosis, popillae

- Pain
- Swelling
- Cramping
- Edema

Chronic lymphedema: Skin changes

- Buffalo Hump: Concavity lost around the ankle
 - lymphedema in the dorsum of the foot
- · Squaring of the toes.
- Stemmer's sign: Inability to pinch the skin over the dorsum of the foot





Associated malignancy:

- Stewart Treves Syndrome → Lymphangiosarcoma
 - Bluish reddish nodules
 - Seen usually if lymphedema is > 10 yrs
- Liposarcoma
- · malignant melanoma
- · Basal cell carcinoma
- Squamous cell carcinoma.



```
Lymphangioma:
```

- Swelling along lymphedematous limb.
- Collection of lymphatic fluid

If - < 5 cm → Lymphangioma circumscriptum

- > 5 cm q diffuse → Lymphangioma diffusum
- Reticular arrangement → Lymphedema Ab igne

Management: lymphedema

00:12:26

- Investigation:
 - Gold standard Direct puncture lymphangiography

(dorsum of foot between the toes - dye injected)

- Tc_∞ Scan → Sulphur colloid particles (less invasive)
 - 3 Abnormalities
 - Distal obstruction (mc) → 80% cases
 - Congenital hyperplasia - Proximal obstruction | 10% cases each
- Limb volume grade lymphedema

→ Excess limb volume

a0 - 40% - moderate Lymphedemo

Gold standard: Water plethysmography

Treatment:

- Skin care
- · Pain control
- Swelling

medical / conservative

- · Limb elevation skin care
- · Antibiotics
- Pain control
- manual Lymphedema Drainage (MLD)
- DLT (decongestive lymphedema therapy)

Surgical

- Resective
 - procedure
- Procedure

to improve

drainage

DLT (Decongestive Lymphedema Therapy)

Aggressive phase: multilayer

maintenance phase

Lymphedema bandaging
Graded compressive pressure

1

Ankle → 100%

Knee → 70%

Thigh → 50%

Groin → 30%

- Surgical management :
- Improve drainage: Anastomosis between lymphatics / nodes with veins

Neibulowitz procedure

Ileal mucosal patch

Kinmonth procedure

- Resective procedure -
 - Sistrunk (mc done)
 - · Wedge of skin / subcutanous tissue removed
 - Homans
 - Thompson Severe filariasis / elephantiasis
 - Cosmetically less preferred procedure





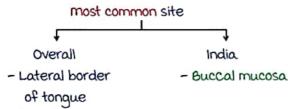


Thompson procedure

Homan procedure

ORAL CANCER

· Site of oral cancer



- Pathology of oral cancer
 - Squamous cell cancer (SCC)
 - most common gene mutation p 53
- Verrucous cancer
 - Slow growing
 - Grows outwards
 - Cause: HPV (Human papilloma virus)
 - Good prognosis

Oral cancer - Risk factors

00:01:54

Risk factor

- 1. Smoking
- a. Alcohol
- 3. Tobacco
- 4. Sharp ill-fitting denture
- Infections → HPV, EBV [Epstein Barr virus] ⇒ Nasopharyngeal cancer

Pre-malignant conditions



High risk

medium risk

Low risk

- 1 Erythroplakia
- (1) Oral submucous
- - **fibrosis**
- (Homogenous / speckled)
- (ii) Proliferative verrucous (ii) Syphilitic glossitis
- leukoplakia
- (iii) chronic hyperplastic candidiasis
- (ii) Discoid lupus erythematosus
 - (iii) Discoid Keratosis

1) Oral lichen

planus

congenita

Hyperplastic candidiasis ←

 erythematous border (Classical sign)

Cannot be rubbed off



- > Leukoplakia
 - white patch
 - cannot be rubbed off

1. leukoplakia

- White patch in oral cavity
- cannot be rubbed off
- ↑ Risk of cancer → 3-5 times

Types of leukoplakia

Proliferative verrucous leukoplakia

- 50% chance of malignant conversion
- rare
- lack typical risk factor of oral cancer
- multifocal
- regular follow up done
- In case of malignancy

management - Resection

Speckled leukoplakia

- Leukoplakia over erythematous border
- most aggressive type
- High chance of malignancy



- a. Erythroplakia
 - Red patch in oral cavity
 - ↑risk of cancer → 6-9 times
 - most aggressive type -> speckled erythroplakia.
 - management Co_a laser excision
- 3. Chronic hyperplastic candidiasis
 - Classical sign → erythematous border
 - white patch can be rubbed off

- 4. Oral submucous fibrosis
- Hypersensitivity reaction to beetel nut
- Fibrous band ⇒ inadequate mouth opening
- Poor oral hygiene ⇒ ↑ Risk of cancer
- management
 - Stop smoking /beetel nut consumption .
 - Antioxidants



Definitive management -> intralesional Triamcinolone injection.

- Intralesional triamcinolone

used in other conditions - Keloid, costochondritis

- 5. Oral lichen planus
 - ulcerative
- 6. Syphilis
- 7. Plummer vinson syndrome
 - also known as sideropenic dysphagia / Patterson Kelly Brown syndrome
 - · seen in perimenopausal women
 - Clinical presentation: iron deficiency anaemia

Koilonychia

upper esophageal / post - cricoid web

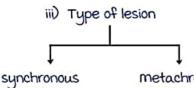
Dysphagia

- Trisk of a cancers
 - pharyngeal cancer
 - SCC of esophagus

Oral cancer - clinical features & diagnosis

00:13:46

- 1. Field cancerisation
 - i) multiple tumors can arise
 - ii) site: Oropharyngeal colorectal Bladder





metachronous lesion

- Occurs within
- · occurs > 6 month
- 6 month
- Risk of recurrence → 15%
- iv) clinical features: ulceroproliferative lesion
- v) Diagnosis

a. TNM - staging of oral cancer

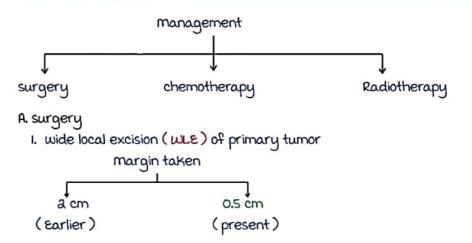
Change	7th Ed. (2010)		Ed. (2017)	
C. m. No	, ui Eu. (2010)	Oral Cavity	HPV- Oropharynx	HPV+ Oropharynx
T-stage	T0: no primary T1: size s2cm T2: size 2-4cm T3: size >4cm T4: • T4a: moderately advanced (extrinsic tongue muscle involvement constituted T4a) • T4b: very advanced	T1: size ≤2cm and DOI ≤5mm T2: size ≤2cm and DOI ≤5mm T2: size ≤2cm and DOI ≤10mm T3: size >4cm and DOI ≤10mm T3: size >4cm or >10mm DOI T4a extrinsic tongue muscle infiltration now deleted	• T0 deleted	To if proven p 16+ disease without evidence of primary tumor All locally advanced combined to T4
	N0: no LN involved N1: single ipsi LN s3cm in size N2: o N2s: single ipsi LN, 3-6cm in size	N1-N2 is same as previous and ENE N3 now with subcategories: N3a is previous N3 (size >6cm N3b is any ENE(+), either clini	n) and ENE(-) ical or radiographic	Previous N1, N2a combined to N1 («Scm with or without ENE) Previous N2b, N2c combined to N2
	o N2b: multiple ipsi	Patholo	ogical N-stage	
	LNs, all s8cm in size o N2c: any bi or ctr LNs, all s8cm in size N3: any LN >6cm in size	Microscopically evident ENE(+) LNs	results in upstaging	N1: <4 LNs involve N2: >4 LNs involve N3 deleted
Stage grouping	Ctinical or pathological TNM used for same grouping system	Same as previous	1	Separate clinical an pathological TNM groupings

AJCC - 8th (updates)

- i) 001 depth of invasion
- ii) ENE Extra nodal extension
- iii) HPV+, p16+ oral cancer

Oral cancer - Management

00:25:44



Segmental Hemi - mandibulectomy marginal
Segment of mandible Half of mandible removed inner/
removed outer table
of mandible
removed

- 3. Lymph mode involvement ⇒ neck dissection
- Commando procedure ⇒ 1 + 2 + 3 (above steps)
- 5. Reconstruction

Flaps used in various cancers

1. Oral cancer



→ Pectoralis major myocutaneous (Pmmc) Flap

- most commonly used flap for head \(\gamma\) neck surgery → PMMC flap
- DP flap → Based on perforators of internal mammary
- a. Lip & angle of mouth reconstruction



Abbe Estlander flap/lip switch flap

3. mandibular reconstruction

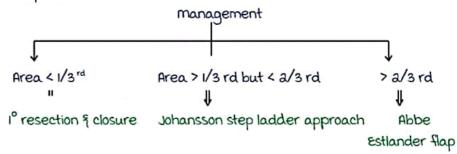


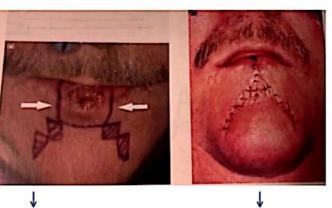


> Free fibular flap

- Iliac crest flap (deep circumference iliac artery flap) ⇒ dentate mandible

a. Lip cancer



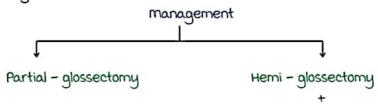


Skin marking for Johansen step reconstruction

Lip closure & labiomental step

Tongue reconstruction

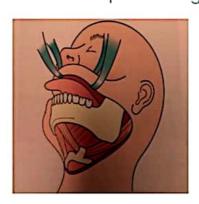
b. Tongue cancer



Oral cancer - Types of approach

a. Visor approach

Provides better exposure of tongue, floor of mouth



```
b. Intra oral approach
```

c. Lip split approach

Bilateral (B/L) cervical lymphnode enlargement

Sites -

- (i) Tip of tongue
- (ii) angle of the tongue
- (iii) Lip cancer → crossing the midline

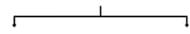
b. Chemotherapy for oral cancer

- · 5 fluorouracil
- Cisplatin

Chemotherapy → given for cases with lymph node involvement

C. Radiotherapy

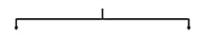
- Radiotherapy → given to reduce LRR (locoregional recurrence)
- Types



Brachytherapy

EBRT [External Beam Radiotherapy]

· Combined chemoradiation



NACT

Adjuvant chemotherapy

[Neo adjuvant chemotherapy]

Note:

- Oral cancer
 - most important prognostic factor → cervical lymphnode status
 - most common metastasis → lungs

Anatomy of cervical lymph nodes

00:38:23

AD- Anterior digastric

PD- Posterior digastric

SCM- sternocleidomastoid

SO- Superior Omohyoid

10- Inferior omohyoid

level 11 -upper deep cervical

Delphian LN

level III-mid deep cervical

level IV-lower deep cervical

level v -posterior compartment

Level VII → mediastinal LN

Central compartment - Boundaries :

Superior - Hyoid bone

Inferior - Suprasternal notch

On either sides - Carotid sheath

- The cancers that first drain into level - vi Lymph nodes are



- i) Laryngeal cancer
- ii) Thyroid cancer

Neck Dissection

00:45:0

modified schobinger's incision



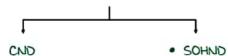
Types of Neck Dissection

- 1. Radical Neck Dissection
 - By crile
 - Removal of Level 1-V + 3 extra lymphatic structures E sternocleidomastoid + Internal jugular vein + spinal accessory nerve]

a. MRND

- modified radical neck dissection
- Incision modified schobinger's.
- Removal of level I-V but save at least 1 extra lymphatic structure
- Functional neck dissection ⇒ all 3 extra lymphatic structure are saved
- In case of bilateral neck dissection ⇒ save IJV on one side to prevent facial /cranial edema

3. Selective neck dissection



(Central Neck Dissection)

(supra - Omohyoid Neck Dissection)

- only level v1 lymph node removed

- Removal of level i, ii,iii

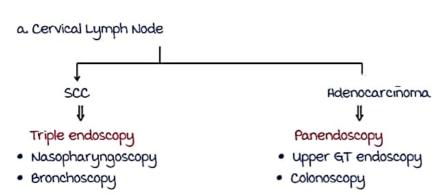
Extended SOHND

- Removal of level i, ii, iii, iv

Complications of Neck Dissection

- (i) Hemorrhage
- (ii) Injury to nerve
 - marginal mandibular nerve (Ramus mandibularis) a branch of facial nerve which supplies angle of mouth
 - lingual nerve
 - Hypoglossal nerve
 - phrenic Nerve
- (iii) Seroma
- (iv) flap necrosis
- (V) Shoulder dysfunction [injury to spinal accessory nerve]
- (vi) Carotid artery blow out C complication associated with maximum mortality]

Metastasis from an unknown primary to cervical lymph node



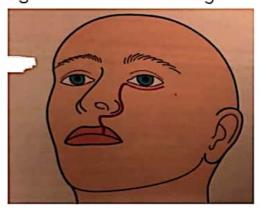
Esophagoscopy

- Bronchoscopy
- b. Blind sites where cancer can be missed Tonsillar fossa
 - Retromolar trigone
 - · Floor of mouth
 - pyriform fossa
 - · Fossa of Rosenmuller

c. PET scan $\rightarrow \downarrow$ incidence

Note:

weber Ferguson incision for maxillectomy



SALIVARY GLANDS

Ranula 00:00:24

- Ranula → Frog's belly
- It is mucous extravasation cyst involving sublingual salivary gland
- Clinical features
 - (i) Cystic swelling in the floor of the mouth
 - (ii) Fluctuant & Brilliantly transilluminant
 Other Brillianty transilluminant swelling: Cystic hygroma
 Epididymal cyst
 Hydrocoele
- Diagnosis

Based on clinical features

management

Excision of cyst
 marsupialization

Sublingual gland



- Most common structure injured during ranula surgery
 - -> Sub mandibular duct
- most common nerve injured → Linqual nerve
- Plunging ranula.
 - Mucus retention cyst involving Sublingual & Submandibular gland
 - Swelling in oral cavity & neck
 - management: Excision of intra-oral swelling

Sub-lingual gland

Aspiration of neck swelling

- Other conditions
 - (i) mucus Retention Cyst
 - involves minor salivary gland
 - management: excision of cyst
 - (ii) Stafne bone cyst
 - most common site of ectopic salivary tissue
 - no treatment required





- a° to acute parotitis
- Seen in
 - · Immuno-compromised children
 - Elderly (dehydrated)
 - a° to parotid duct stone
- Causes: Staphylococcus aureus Streptococcus



- (i) Painful enlargement of gland
- (ii) Fever
- (iii) Pus oozing out from parotid duct opening
- (iv) Trismus
- Diagnosis
 - (i) Clinical diagnosis
 - (ii) Sialography → Contraindicated

Fluctuation → late sign

- management
 - Antibiotics
 - Aspiration
 - Fails

Incision & Drainage (190)

Hilton's method - An Abscess close to neurovascular bundle

Forceps is opened parallel to neurovascular bundle 9 Not perpendicular

Prevents damage to the nerve - Important in Parotid & Axillary Abscess

Recurrent Parotitis in children

- common in age 3-6 yrs
- Repeated attacks of Parotitis
- X-ray → Snow Storm appearance
- management
 - Antibiotics
 - Repeated wash outs



Sialolithiasis 00:12:14

- Formation of stone in salivary gland
- · more common in Submandibular > Parotid gland

[Reason - Submandibular secretions are more viscous

- Anti gravity drainage]
- most common composition → CaPO
- 80% stones → Radio-opaque
- Clinical features

meal time syndrome - Post-prandial neck swelling (painful)

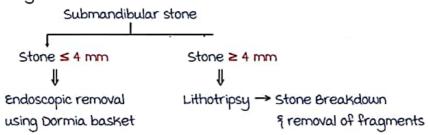
Subsides in 1-a hrs

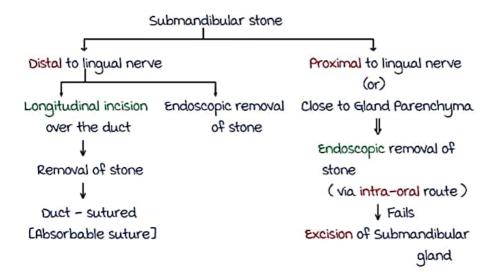
Investigation

(Investigation Of Choice)

Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with Marrow Edition 4 videos.

management





most common nerve injured → lingual nerve during surgery

Leave Feedback

Salivary gland tumors

	Benign	malignant
Parotid	90%	10%
Submandibular	50%	50%
Sublingual	20%	80%
minor salivary	10%	90%

Parotid Tumor

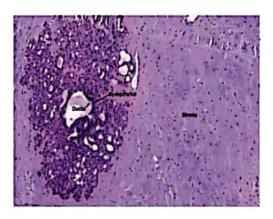
Parotid gland Superficial Deep lobe (mostly involved)



- Parotid swelling
 - Classical sign → Swelling + elevation of ear lobule
- Clinical examination
 - Deep lobe enlargement → Tonsillar fossa pushed medially
- Note
- (i) most common parotid tumor overall → pleomorphic adenoma.
- (ii) most common parotid tumor in children → Hemangioma
- (iii) most common malignant parotid tumor → mucoepidermoid cancer
- (iv) a^{nd} most common malignant parotid tumor \rightarrow adenoid cystic cancer

Pleomorphic adenoma

00:23:46



- more common in females > males
- Involves superficial lobe of parotid (usually)
- Clinical features
 - slow growing parotid swelling
 - Superficial lobe
 - Painless

- Diagnosis
 - FNAC
 - Extent of the swelling → mRI > CT
- management

anagement

Superficial parotidectomy

Extracapsular dissection

- Recurrence rate
 - High recurrence rate
 - Reason The growing end of tumor → Finger like projections

During surgery, if the finger like projections are left behind

Recurrence

Pathology

Epithelial + mesenchymal component

mixed malignant tumor

(i) Pleomorphic adenoma — malignant mixed malignant tumor change

- (ii) Also known as carcinoma ex pleomorphic adenoma
- (iii) Feature suggesting malignant change
 - Rapid increase in size
 - Involvement of facial nerve
 - Involvement of lymph nodes [LN]
 - ulceration over swelling
 - Hard swelling
 - Sudden onset of pain
- (iv) management

Surgery followed by radio therapy

Warthin's tumor

00:28:52

- Known as Adenoma lymphomatosum
- and most common Benign tumor
- male > Females
- 3rd / 4th decade of life
- Associated with smoking & radiation exposure
- 10% → Bilateral
 - [.: most common Bilateral (B/L) parotid tumor]
- Clinical features
 - Parotid swelling (Tail of parotid)
- Diagnosis
 - FNAC

- Extent of swelling: MRI > CECT
- management

Superficial parotidectomy or extracapsular dissection

Other parotid swellings

00:31:13

- Mucoepidermoid carcinoma.
 - most common malignant parotid tumor
 - Associated with radiation exposure
 - seen in infancy
- a. Adenoid cystic carcinoma
 - and most common malignant parotid tumor
 - Perineural invasion

- Extremely painful
- 1 recurrence rate
- Histopathological examination [HPE]
 - "Swiss Cheese" pattern

management

Both adenoid cystic & Mucoepidermoid Cancer

Surgery followed by RT (Radio therapy)

- 3. BLEL
 - Benign Lymphoepithelial Lesion [BLEL]
 - Associated with Cmv (Cyto megalo Virus)
 - Also Known as Godwin's tumor
 - malignant change <5% cases
 - Eskimoma

Parotidectomy

00:34:12

- (i) Incision → modified Blaire's / Lazy 's' / Sistrunk's
 - a finger breath below the angle of mandible

Prevents injury to marginal mandibular nerve

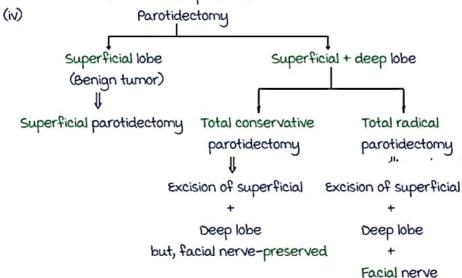
- Injury to marginal mandibular nerve

Drooping of angle of mouth



- (ii) Bipolar cautery preferred
 - Prevents nerve injury
- (iii) Pointers for facial nerve
 - a. Conley's / Tragal pointer (most significant)

 [Nerve 1 cm inferior & deep to the pointer]
 - b. Styloid process
 - [Nerve superficial to styloid process]
 - c. Posterior belly of digastric
 - d. Retrograde method
 - incase of re operation



- Facial nerve removal

Cable graft - used to bridge the gap

Greater Sural nerve

auricular nerve (Best)

(most common)

- Sutured using Nylon sutures

Extracapsular dissection of parotid

- Done for Benign tumors of parotid
- Advantage → Same oncological results as superficial parotidectomy with less complication rate

Less chance of facial nerve injury

- An alternative to superficial parotidectomy [Benign tumors]

Complications of parotidectomy

00:40:35

- 1. Bleeding
- a. Injury to nerve
 - marginal mandibular nerve → Drooping of angle of the mouth
 - Greater auricular nerve → Anaesthesia over angle of mandible [Allms - may 2019] (parotid)
 - Facial nerve
- Parotid fistula 3.

Duct of parotid Gland Low output fistula

· High output fistula

Spontaneous closure of fistula

Newmann & Seabrook's procedure

- 4. Frey's Syndrome
 - Gustatory sweating
 - Cause: post ganglionic parasympathetic fibres of auriculo-temporal nerve

Supplies skin glands

Gustatory sweating

- Diagnosis: Starch iodine test
- management : (i) Antiperspirants
 - (ii) Botulinum toxins
 - (iii) Definitive management → Tympanic neurectomy (Dissection of auriculo-temporal nerve)
- prevention
 - (i) Extra-capsular dissection
 - (ii) Sternocleidomastoid / Digastric muscle flap [to cover parotid bed]



- Clinical differentiation between Submandibular gland Vs LN enlargement
 - Submandibular aland Bimanually palpable enlargement
 - LN enlargement Not palpable bimanually
- Most common Benign tumor & overall Pleomorphic adenoma
- most common malignant rumor Adenoid cystic carcinoma.
- Kuttner's tumor

Chronic sclerosing sialadenitis of submandibular gland

- · management of submandibular tumors
 - Excision of the gland

If malignant ⇒ Radio therapy given





- Structures injured during surgery
 - marginal mandibular nerve
 - Linqual nerve
 - Hypoglossal nerve
 - Anterior facial vein
 - Facial artery

Sublingual swelling

00:52:52

- most common tumor
- most common tumor of minor salivary gland

Adenoid cystic tumor

Most common site of minor salivary tumor → Hard palate
 L most common tumor of hard palate → SCC (squamous cell carcinoma.)]

Note:

multiple cyst in ← parotid



Swiss cheese appearance

- Seen in HIV parotitis

SPLEEN

Splenic anatomy

00:00:16

- \rightarrow Long axis of spleen \rightarrow 10th rib.
- → Enlargement of spleen→
 - Notch → superior border
 - Downward displacement of spleen prevented by phrenicocolic ligament.
- \rightarrow Splenic artery \rightarrow (Branch of coeliac trunk)

Short gastric vessels \longrightarrow lie in gastrosplenic ligament.

→ Splenic vein joins superior mesentric artery to form portal vein .

Functions of spleen:

- 1. Immunological
- a. Filter
- 3. Pitting
- 4. Haemotopoiesis.
- 5. Reservoir function

Spleneculi:

- Accessory splenic tissue
- m.c. site → hilum of spleen
 (50 60 %)
- If missed during surgery → recurrence of hematological conditions → ITP

Splenic cysts

00:04:56



Splenic artery aneurysm:

- ightharpoonup Splenic artery ightharpoonup most common visceral vessel to be involved with aneurysm .
- → most commonly seen secondary to pancreatitis
- → more common in females than males
- → Females of child bearing age
- → Seen during pregnancy
- → Involve the main trunk of artery.

Clinical features: Asymptomatic

→Ruptur I

Common in third trimester

Clinical features similar to splenic rupture

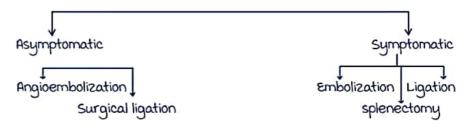
--- Peritonitis

ightarrow If rupture occur during pregnancy ightarrow high rate of fetal loss.

On examination - hear a bruit over aneurysm.

IOC : CECT

management:



Splenic infarct

00:11:15

→ Hypersplenism.

Clinical features:

- → Vague abdominal pain.
- → Pain radiates to left shoulder tip.

IOC - CECT

management \longrightarrow Only if symptomatic or abscess develops .

Splenectomy

→ Septic emboli in : • Typhoid fever

- Pancreatitis
- · Otitis media

Clinical features: Vague abdominal pain

→ Left shoulder tip pain

→ Fever

→ Features of peritonitis

IOC -- CECT

management :- USG guided → pigtail drainage.

Splenic tumors:

- \rightarrow most common benign tumor of spleen \rightarrow Haemangioma
- → m. C. malignant tumor of spleen → Lymphoma
- → metastasis is rare.

Splenectomy

00:15:55

- Ligate short gastric vessels.
- Splenic vessels ligated
- Careful not to injure tail of pancreas.

Complications following splenectomy:

- Hemorrhage → reactionary / secondary hemorrhage.
- a. Injury to tail of pancreas --- pancreatic fistula

Diagnosis → drained fluid is turbid and rich in amylase.

- Close spontaneously with time.
- 3. most common complication:
 - left lower lobe atelectasis.

if not corrected post operative day a - 3

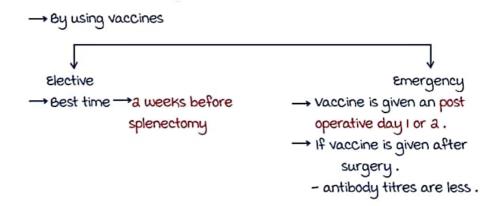
Pneumonia

5. OPSI -- opportunistic post splenectomy infections

- Caused by encapsulated bacteria
- m.c. organism → pneumococcus
- Other organism → Hemophilus influenzae.
 → meningococcus.
- more common in children as compared to adults.
- → Prophylactic antibiotics → penicillin
 continue for a years
- → First two years after splenectomy → commonly occurs
- → more common in hematological conditions as compared to trauma. (if vaccine is not given)
- \rightarrow High mortality rate.

Prevention of OPSI

00:25:25

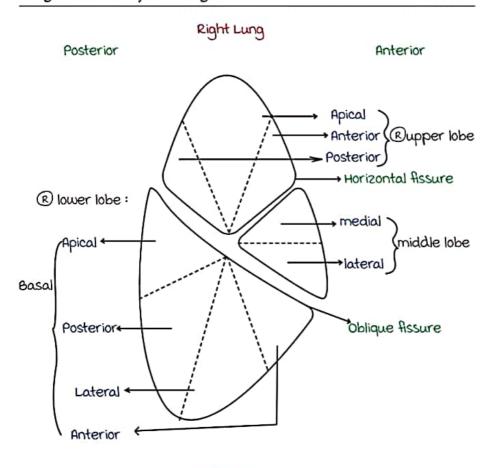


- Pneumococcal vaccine should be given after a years of age \rightarrow repeated after 5 years.
- Hemophilus and meningococcal vaccine can be given at any age.
- Hemophilus influenza vaccine repeated after 10 years.
- \longrightarrow If patient has dog , cat or animal bite \longrightarrow OPSI can occur due to capnocytophaga canimorsus .

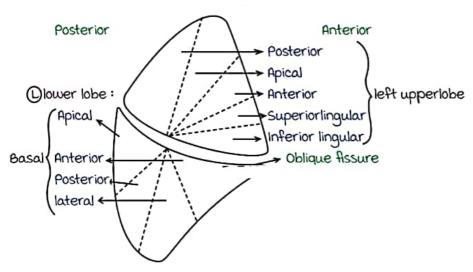
THORAX AND MEDIASTINUM

Surgical Anatomy Of Lung

00:00:27



Left lung



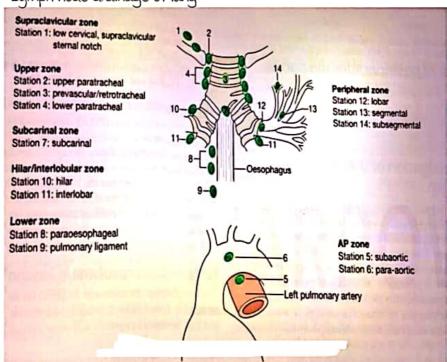
. (R) Bronchus is more vertical than (L) Bronchus

If inhaled foreign body → (R) lung > (L) lung

If aspiration

. Commonly involved (R) Segments : . Posterior segment of Apical lobe . Apical Segment of lower lobe

Lymph node drainage of lung:



Warning: Not all points are covered in the notes, especially conceptual explanations. Please use the notes in conjunction with marrow Edition 4 videos.

Thoraco Score: to assess the morbidity & mortality after thorasic Surgery

- 1) Age
- a) Sex
- ASA Classification (American Society of Anesthesiologists) (≤ a, ≥ 3)
- Severity of dyspnoea according to medical Research (≤ a, ≥ 3)
 Council scale
- 5) Performance Status according to Zubrod Scale (≤ a, ≥ 3)
- 6) Extent of resection (Pneumonectomy, other)
- 7) Priority of surgery (elective, urgent / emergency)
- 8) Diagnosis (malignant, benign)
- 9) comorbidity score

Pneumothorax

00:05:06

Spontaneous pneumothorax

— Primary

— Secondary

- Primary spontaneous	- Secondary spontaneous
- No Underlying lung Condition	- a° to underlying condition
₫>₽	— Tumor
- Tall, thin males	_ COPD
- Family hisory ⊕	Infection
- Rupture of apical bleb / bullae → Cau	se - o'> ♀

- Clinical features:

- Tolerated better

- Sharp pleuritic pain : - Partial Collapse of lung

Pain 1, breathlessness 1

 Complete Collapse of lung Painless, Breathlessness ↑

- management:
 - 1° Spontaneous : Self limmiting
 - aspiration done only if symptomatic
 - 2° Spontaneous : Aspiration has to be done
 - Narrow chest tube⊕
 - Surgery

Indications for surgical intervention for pneumothorax include:

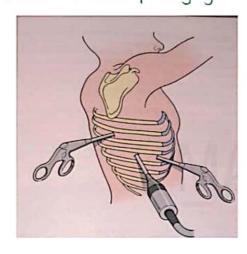
- Second ipsilateral pneumothorax
- First contralateral pneumothorax
- Bilateral spontaneous pneumothorax
- Pneumothorax fails to settle despite chest drainage
- Spontaneous haemothorax: professions at risk (e.g. pilots, divers)
- Pregnancy

Rule of Thumb:

- If patient has 1^{st} episode of Spontaneous pneumothorax; there is a $1/3^{rd}$ chance of recurrence
- and episode -50% of them will develope pneumothorax
- 3rd episode 100% will develop pneumothrax

Surgical options in pneumothorax:

- VATS (Video Assisted Thoracoscopic Surgery)



. Open Surgery

Empyema 00:15:03

- . Pus in pleural Space.
- . 3 phase:
 - Exudative phase : . Thick Pus
 - . Causative organism : S. Aureus
 - . streptococcal
 - Antibiotics to be started
 - Aspiration → Advised
 - Fibropurulent phase: .Thickening of Pleura
 - . Pus can thicken further
 - . Antibiotics 1
 - . Aspiration H
 - Organised phase: . Fibrosis → lung gets trapped

↓ lung expansion

- . Surgical intervention (VATS > open)
 - Drain out Collection
 - Pleurodesis
 - Decortication (in severe cases)

Lung Cancer

00:19:16

- . maximum Cancer related mortality in both of 9 9
- . Only 20% patients come with resectable disease
- . Risk factors : Smoking, pollution, environmental cause, exposures.

Non Small cell

Adrenocorticotropic hormone

Growth hormone-related peptide

Antidiuretic hormone

Anti-GAD65, CRMPS

Anti-HuD, Anti-Yo

Anti-amphiphysin

Anti-recoverin

Anti-Ri

Anti-VGCC

Paraneoplastic Syndrome Hormone/Antibody

Endocrine Cushing's disease

SIADH

Acromegaly

Neurologic

Encephalitis

Lambert-Eaton syndrome

Cerebellar degeneration

Stiff-person syndrome

Opsoclonus/myoclonus

Small cell

(Oat cell)

↓

 Strongest association with Smoking

3> P

- Poor prognosis
- Highly chemo sensitive
- maximum Paraneoplastic syndrome
- mc lung cancer to give rise to
 SVC Syndrome(Superior Vena cava Syndrome)
 - Facial 9 cerebral edema
 - Hypertention
 - Breathlessness
 - CT show; Thrombus in SVC
- management:
 - small cell → Chemo
 - Non small cell → Radiotherapy(TOC)
 - Steroids
- Histopathology : Azzopardi effect
 - Salt & pepperchromatin
- Immuno histochemical markers
 - NCAN
 - Chromogranin

- Non small cell carcinoma

- i) squamous cell Carcinoma:
 - Centrally placed
 - Associated with smoking (mc cancer in smokers)
 - -ु >े
 - Releases PTH related Peptide → Hypercalcemia
 - Mc lung Cancer to give rise to Pancoast Tumor

(Apex of the lung)

Press On Brachial plexus

Active space

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Horner's Syndrome
                              Pain along Ulnar nerve
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EPtosis, miosis, anhidrosis,

enopthalmos]

- . Histopathology : Keratin pearls
- . Immunohistochemistry:. Cytokeratin⊕ . P40 (New marker)

ii) Adenocarcinoma:

- · ð > ९
- . mc lung cancer overall
- . Peripherally placed slow growing
- . metastasis → Early [lymphnodes 9 distantsite)
- . maker → Napsin4
- . mutations → ALK, RAS
- iii) Bronchoalveolar Carcinoma K/a Adenocarcinoma in Situ.
 - Lepidic pattern of growth (grows along bronchoalveolar lining)

multifocal

- . can involve other lung
- . Not metastatic → Resectable
- Types



- xray/CT Ground glass appearance
- Clinical feature -> . cough (mc)
 - . Hemoptysis
 - . weight loss
 - . Pleural effusion
 - . other SVC syndrome, Horner's syndrome
- Investigation : xray (initial)
 - CECT (IOC)
 - PET-CT (for Staging)

T.	Tumor in sputum/bronchial washings but not be assessed in imaging or bronchoscopy
To	No evidence of tumor
T _n	Cartinoma in situ
T ₁	≤ 3 cm surrounded by lung/visceral pleura, not involving main bronchus
Tialmi)	Minimally invasive carcinoma
Tie	\$1cm
Tue	>1 to \$2 cm
Tu	> 2 to £3 cm
T ₂	> 3 to 5 5 cm or involvement of main bronchus without carina, regardless of distance from carina or invasion visceral pleural or atelectasis or post obstructive pneumonitis extending to hilum
Tz.	>3 to s4cm
Tan	>4 to sScm
	>5 to £7cm in greatest dimension or
T ₃	>5 to \$7cm in greatest dimension or turnor of any size that involves chest wall, pericardium, phrenic nerve or satellite nodules in the same lobe
T ₃	tumor of any size that involves chest wall, pericardium, phrenic nerve or
T4	tumor of any size that involves chest wall, pericardium, phrenic nerve or satellite nodules in the same lobe > 7cm in greatest dimension or any tumor with invasion of mediastinum, diaphragm, heart, great vessels, recurrent laryngeal nerve, carina, trachea, oesophagus, spine or
T ₄	tumor of any size that involves chest wall, pericardium, phrenic nerve or satellite nodules in the same lobe > 7cm in greatest dimension or any tumor with invasion of mediastinum, diaphragm, heart, great vessels, recurrent laryngeal nerve, carina, trachea, oesophagus, spine or separate tumor in different lobe of ipsilateral lung
T4	tumor of any size that involves chest wall, pericardium, phrenic nerve or satellite nodules in the same lobe > 7cm in greatest dimension or any tumor with invasion of mediastinum, diaphragm, heart, great vessels, recurrent laryngeal nerve, carina, trachea, oesophagus, spine or separate tumor in different lobe of ipulateral lung Ipsilateral peribronichial and/or hilar nodes and intrapulmonary nodes
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T ₄ N ₁ 2 3	tumor of any size that involves chest wall, pericardium, phrenic nerve or satellite nodules in the same lobe > 7cm in greatest dimension or any tumor with invasion of mediastinum, diaphragm, heart, great vessels, recurrent laryngeal nerve, carina, trachea, oesophagus, spine or separate tumor in different lobe of ipsilateral lung Ipsilateral peribronchial and/or hilar nodes and intrapulmonary nodes lipsilateral mediastinal and/or subcarinal nodes Contralateral mediastinal or hilar; ipsilateral/contralateral scalene/ supraclavicular
T ₄ N ₁ 2 3 M ₁	tumor of any size that involves chest wall, pericardium, phrenic nerve or satellite nodules in the same lobe > 7cm in greatest dimension or any tumor with invasion of mediastinum, diaphragm, heart, great vessels, recurrent laryngeal nerve, carina, trachea, oesophagus, spine or separate tumor in different lobe of ipsilateral lung Ipsilateral peribronchial and/or hilar nodes and intrapulmonary nodes lipsilateral mediastinal and/or subcarinal nodes Contralateral mediastinal or hilar; ipsilateral/contralateral scalene/ supractavicular Distant metastasis

 $T_{1-3}/N_{0-1}/m_0 \rightarrow Amenable to lung resection$

. Management : Based on the molecular markers

Investigations:

. mediastinoscopy - To assess f take biopsy from mediastinal lymph nodes



. EBUS : Endobronchial ultrasound.



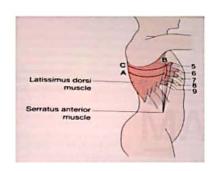
EBUS - FNAC - helps to target peripheral lesions (to rule out TB - lymphnodes)

. Surgery for lung cancer:

- Assess Thoraco score, to see if patient is fit for surgery
- TNM stage is appropriate for surgery.

- . Wedge resection
 - done for early lesions
- . lobectomy early lesions
- . Pneumonectomy
- . or or no nopleastic resection → Sleeve resection done

- Antero lateral Thoracotomy .mc done



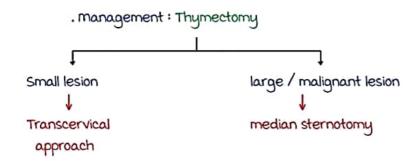
done via Thoracotomy

Benign Lung Tumors

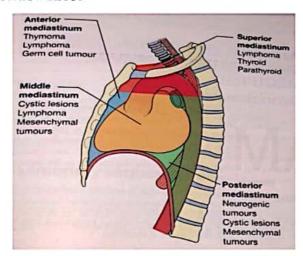
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- . Hamartoma
 - mc benign tumor of lung
 - x-ray: Coin Shaped / Popcorn calcification
 - Incidental diagnosis
 - management Excision.
- . mediastinal Tumors
- Thymoma: . Mc Overall mediastinal lesion
 - . In Anterior mediastinum
 - . associated with myasthenia gravis
 - . Thymectomy even in the absence of thymoma is helpful in mysthenia gravis
 - . Clinical feature → . Majority are asymptomatic
 - . compression of adjacent structure
 - Breathlessness
 - Hoarseness of voice
 - Dysphagia
 - . Malignant thymoma Capsular & Vascular Invasion.

1	Masaoka thymoma staging system.		
Stage	Description		
1	Macroscopically completely encapsulated		
	Microscopically no capsular invasion		
11	Macroscopic invasion into surrounding fatty tissue or mediastinal pleura		
	Microscopic invasion into the capsule		
m	Macroscopic invasion into neighbouring organs (pericardium, great vessels, lungs)		
IVA	Pleural or pericardial dissemination		
IVB	Lymphogenous or haematogenous metastasis		



Other mediastinal masses:



- . Lymphoma Mc seen in anterior mediastinum
- . Pericardial cyst mc middle mediastinal mass
- . Neurogenic Tumors Mc posterior mediastinal mass

 mc mediastinal tumors in children

Germ cell tumors:

- . Mc site for extra gonadal GCT \rightarrow mediastinum
- . Seen at anterior mediastinum
- . Types Benign: . mc in males
 . 75% benign
 . All 3 cell types Dermoid
 malignant: ↑ α FP, ↑ β HCG, ↑ LDH (markers)
- . management Excision

5----

SKIN TUMORS AND SOFT TISSUE SARCOMAS

Basal Cell Carcinoma (BCC)

00:01:04

Also called rodent ulcers. Locally invasive No distant metastasis

Risk factors:

White population
UV radiation
Gorlin syndrome (Basal cell cancer
Nevoid syndrome) → chromosome 9.

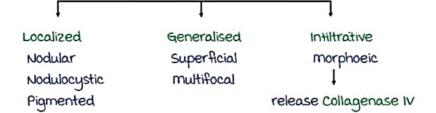


BCC arises from basal epidermis Palisading pattern.









Clinical features:

mc site → Face

Above line joining angle of mouth to ear lobule.

· Rolled - out pearly white edges

Diagnosis:

Biopsy

management:

Surgery (Wide local excision).
 Lymph node metastasis \underset uncommon
 Distant metastasis

- a. Radiography
 - Results similar to surgery
 - · Preferred in elderly patients not fit for surgery

3. Topical 5-Fu creams

High Risk lesions

Adequate surgery to be done

High local recurrence rate

> acm in size

Present at sites where infiltration leads to cranial extension

Recurrent BCC

Develops after immunosuppression

Infiltrative /morphoeic type.

management: mohs micrographic surgery

Remove till no tumour found at base of lesion

Advantages: Less tissue resected

Cosmetically better.

margins negative.

useful in tumors located close to vital structures

Disadvantage:

Time consuming surgery.

Malignant melanoma

00:10:50

Risk factors:

uv radiation

White population

Genetic: Familial atypical mole melanoma syndrome (FAMM)

Tupes:

1. Superficial spreading type (mc)

Prolonged horizontal phase

Young patients

in sun-exposed areas

m.C melanoma to develop in a pre-existing mole

a. Lentigo – maligna (insitw)
 in elderly

Best prognosis

aka Hutchinson's melanotic freckle

3. Acral melanoma

mc melanoma in dark skinned individuals

Sites: palms, sole.
Rapid vertical phase (aggressive)

4. Nodular melanoma

Present as a nodule early & rapid vertical phase worst prognosis

variant → Amelanotic melanoma.

Desmoplastic melanoma

Head & neck region
perineural invasion (PNI) (+)
Painful, 1 loco-regional recurrence (LRR)

Diagnosis of malignant melanoma

00:16:51

Skin Tumors 563 back

and Soft

Sarcomas

Tissue

63

ABCDE rule for early detection.

Asymmetry
Borders (outer edges uneven)
Color (dark black or multiple colors)
Diameter (>6mm)
Evolving (change in size, shape, color)

Biospy → to confirm diagnosis

Hutchinson Sign

- due to melanoma below nail bed.
- Superficial Spreading > Acral







Superficial spreading type

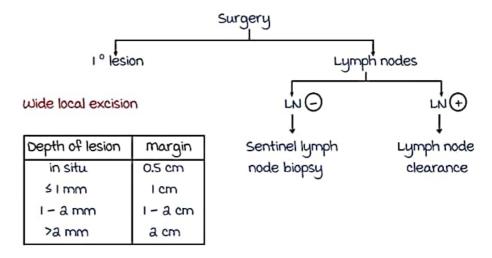
Active spac

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Management of melanoma

V : Subcutaneous tissue

00:20:52



- metastasis → common
- most important prognostic tactor igmpi node status
- most important prognostic factor in melanomas not involving lymph nodes → Depth of lesion
- m. c site for distant metastasis → Lungs.

management of metastatic melanoma:

Immunotherapy

- -> Dabrafenib: BRAF inhibitor
- → Trametinib: against mAPK pathway
- → Iplimumab: against check receptor inhibitors

Immunohisto chemistry

HMB 45

S 100

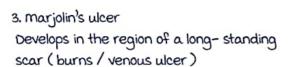
melan A

Precursor lesions:

1. Cutaneous horn

increased risk of squamous cell carcinoma

a. Keratoacanthoma
 in elderly females Symmetrical
 lesion with central crater
 Rapidly enlarging nodular lesion → resected



Diagnosis: Biopsy more aggressive Radiotherapy not effective







Soft Tissue Sarcomas (STS)

00:29:04

m. c STS → Liposarcoma

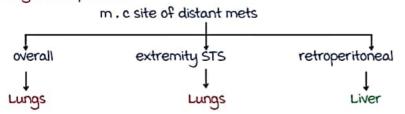
m. c STS in retro peritoneum → Liposarcoma

m. c STS in children

Rhabdomyosarcoma → m. c type : Embryonal m. c site : Head & Neck.

Spread of STS:

1. Hematogenous spread:



- a. Lymph nodes: mets uncommon
 - : LN resection not mandatory, except in:

malignant fibrous histiocytoma

Angiosarcoma

Rhabdomyosarcoma

Clear cell sarcoma

Epithelial

Synovial sarcoma.

Active space

566

LN clearance has to be done

Clinically features of soft tissue sarcomas

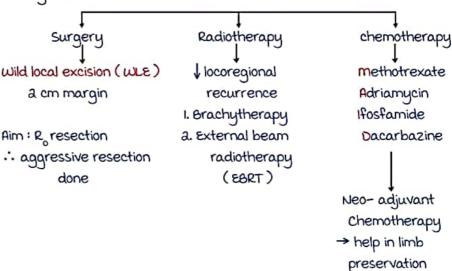
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- m.c → Lump / mass
- Compressive features → Nerve involvement.

Diagnosis: Tru-cut biopsy → insert needle, such that needle mark can be removed in subsequent surgery (prevent recurrence) FNAC has no role.

Staging: mr. (best for local staging) for distant mets: PET - CT

management:



most important prognostic feature → Grade of tumour.

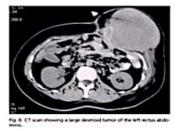
Desmoid tumour

00:40:00

- STS over anterior abdominal wall
- Develop in the region of scars
- Associated with: Gardner variant of FAP syndrome

Clinical features:

- Lump
- Compress the abdominal viscera.



63 Skin Tumors 567dback and Soft Tissue Sarcomas

Diagnosis:

Tru- Cut biopsy

MRI / CT → To visualize extent of disease.

management:

- Wide local excision (WLE)
 (may require complex abdominal wall reconstruction)
- Tamoxifen (desmoid tumours can exhibit ER/PR receptors)
 to ↓ local recurrence.